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Huub Ploegmakers

REGENERATING RUNDOWN AREAS

AN ASSESSMENT OF THE IMPACT OF PLANNING
POLICIES ON THE INDUSTRIAL PROPERTY MARKET



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Regenerating rundown areas

An assessment of the impact of planning policies
on the industrial property market

Proefschrift

ter verkrijging van de graad van doctor
aan de Radboud Universiteit Nijmegen
op gezag van de rector magnificus prof. dr. Th.L.M. Engelen,
volgens besluit van het college van decanen
in het openbaar te verdedigen op maandag 28 september 2015
om 16.30 uur precies

door

Huub Ploegmakers

geboren op 15 mei 1985
te Oss

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PhD Series InPlanning, book 5

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The research conducted for this thesis was part of a research project entitled ‘Gebiedsontwikkeling: (her)ontwikkeling van werklandschappen’, which was financially supported by Platform31 under its ‘Kennis voor Krachtige Steden’ research programme. The research project received additional funding from Oost NV and the municipalities of Nijmegen, Rotterdam and Haarlemmermeer.

ISBN

978-94-91937-12-5

Internal and cover design

Peggy Song (i.o.v. In Ontwerp, Assen)

Photography

Monique van Hooff

Digital access

InPlanning Technical Team

InPlanning Editor in Chief

Gert de Roo

PhD Series InPlanning

Published by InPlanning

Oude Kijk in 't Jatstraat 6, 9712 EG Groningen, The Netherlands

info@inplanning.eu

www.inplanning.eu



InPlanning is legally registered as cooperative under KvK 58997121

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CONTENTS

ACKNOWLEDGEMENTS 10

1 INTRODUCTION 14

- 1.1 Effectiveness of regeneration initiatives on industrial sites 15
- 1.2 Regeneration and industrial property investment 19
- 1.3 Research aim and questions 26
- 1.4 Evaluating planning policies 30
 - 1.4.1 Assessing the impact of regulatory instruments 32
 - 1.4.2 Evaluating urban regeneration 35
- 1.5 Evaluation approach 37
 - 1.5.1 Evaluation methods 37
 - 1.5.2 Collection of data 41
- 1.6 Relevance 44
- 1.7 Outline of the thesis 46

2 UNDERSTANDING INDUSTRIAL LAND SUPPLY 48

- 2.1 Introduction 49
- 2.2 The process of industrial land development in the Netherlands 51
- 2.3 Behavioural economics and developer decisions 56
- 2.4 The results of interviews with municipalities supplying industrial land 59
 - 2.4.1 Research method 59
 - 2.4.2 Methods used to forecast demand 61
 - 2.4.3 The role of the development appraisal in the investment decision process 63
- 2.5 Concluding remarks 66

3 DETERMINANTS OF INDUSTRIAL LAND PRICES 70

- 3.1 Introduction 71
- 3.2 Behavioural economics and value formation in real estate markets 73
- 3.3 Determination of asking prices – qualitative evidence 77
- 3.4 Model specification 80
- 3.5 Description of the data 82
- 3.6 Determination of asking prices – quantitative evidence 86
- 3.7 Concluding remarks 89

4 COUNTERING DECLINE OF INDUSTRIAL SITES 92

- 4.1 Introduction 93
- 4.2 Targeting industrial sites for regeneration 95
 - 4.2.1 Introduction 95
 - 4.2.2 Targeting the right areas 96
 - 4.2.3 Decline and regeneration of industrial sites in the Netherlands 99
- 4.3 Data description 102
- 4.4 Results: differences between targeted and non-targeted sites 109
- 4.5 Conclusions 113

5 PLANNING INTERVENTION AND BUSINESS DEVELOPMENT 116

- 5.1 Introduction 117**
- 5.2 Evaluating the impact of planning
on property market outcomes 119**
 - 5.2.1 A lack of information on the
impact of planning on commercial
property markets 119**
 - 5.2.2 Insufficient attention for the
micro level of supply 120**
 - 5.2.3 Inadequate consideration
of the potentially varied
impact of different planning
interventions 121**
- 5.3 Model description 122**
- 5.4 Data 123**
 - 5.4.1 Dependent variable 123**
 - 5.4.2 Indicators of
planning intervention 125**
 - 5.4.3 Firm characteristics 126**
 - 5.4.4 Site attributes 128**
- 5.5 Results 129**
- 5.6 Concluding remarks 135**

6 EVALUATING URBAN REGENERATION 138

- 6.1 Introduction 139**
- 6.2 Evaluating urban regeneration 141**
- 6.3 Regeneration policies for
rundown industrial sites in the
Netherlands 143**
- 6.4 Propensity score matching 146**
 - 6.4.1 Introduction 146**
 - 6.4.2 The probability of physical
regeneration initiatives 147**
- 6.5 Description of the data 149**
- 6.6 Empirical results 151**
 - 6.6.1 Probit results 151**
 - 6.6.2 Comparison of regeneration
sites and matched sites 153**
- 6.7 Conclusion 157**

7 CONCLUSIONS 159

- 7.1** The impact of planning policies on the performance of the industrial property market 160
 - 7.1.1** Process of municipal land development 162
 - 7.1.2** Targeting of regeneration initiatives 163
 - 7.1.3** The impact of the planned provision for new industrial development 164
 - 7.1.4** The effectiveness of physical regeneration initiatives 165
 - 7.1.5** The impact of planning policies on the performance of the industrial property market 166
- 7.2** Contribution to existing research 167
- 7.3** Limitations of the research 171
- 7.4** Directions for further research 172
- 7.5** Policy implications 174
 - 7.5.1** Physical regeneration 174
 - 7.5.2** The provision of land serviced for development 175

REFERENCES 178

SUMMARY 208

SAMENVATTING 211

ACKNOWLEDGEMENTS



The installation of wildlife overpasses and the expansion of Schiphol airport – at first glance, these large-scale public investments in the physical environment appear to have little in common. Yet, both have attracted national media coverage in recent years for the specific reason that their effects have not been well documented.

In the case of wildlife overpasses there is no direct empirical evidence on their ability to provide connectivity for populations fragmented by roads. Over the past three decades, the national government has devoted substantial resources to the construction of wildlife crossing structures in its effort to mitigate the negative effects of the motorway network on wildlife populations. Despite the high costs associated with wildlife overpasses, there is limited knowledge of the effectiveness of these type of structures. So far, research has documented the number of species using the structure, but use of an overpass alone does not guarantee that these structures have been successful in restoring connectivity between populations. Important questions therefore remain as to whether these structures facilitate effective dispersal across road networks. Evaluation research that addresses these questions would ideally require large-scale genetic sampling for DNA since increased movements between subpopulations divided by roads may restore gene flows and reduce genetic differences between populations

The case of the Schiphol airport expansion is also characterized by an absence of data, particularly recorded noise data, on which to base assessments of its environmental effects. In 1995, the central government released a spatial plan for the development of Schiphol airport, which called for the construction of a fifth runway (the Polderbaan) in conjunction with the reconfiguration of two existing runways. It articulated a twofold objective: strengthening Schiphol's position as an international transport hub and improving the quality of the environment in its immediate surroundings. The latter implied that the airport expansion would not worsen air quality and public safety and even lead to a reduction in aircraft noise levels. In 2006, an evaluation requested by the Senate of the Dutch Parliament concluded that the number of people suffering from serious noise nuisance had indeed declined. Interestingly, though, the magnitude and extent of aircraft noise exposure was –and still is – determined using a simulation model that predicts noise levels using information about the actual number and timing of aircraft movements and aircraft types. Up until now, there have been no systematic attempts to directly measure sound exposure levels for evaluation purposes, even though existing research suggests that actual noise measurements may turn out to be higher than predicted noise levels.

This lack of evaluations is not symptomatic of public expenditure in either wildlife overpasses or airport expansion. Instead, this seems to be a deficiency prevalent across many programmes and policy initiatives in the Netherlands that attempt to shape the natural and built environment. During the course of my PhD trajectory I have been concerned with assessing the effectiveness of another national policy that has not been subject to rigorous evaluation – regeneration programmes for rundown industrial sites. From the onset it was evident that this project would entail a quantitative evaluation of these policies using, although this was not yet clear at that time, econometric techniques to isolate the relationship between the interventions being evaluated and the intended outcomes. For me this implied a venture into unknown territories. Trained as a spatial planner, I had not even heard of the term ‘econometrics’ when I started my PhD. I have not regretted the choice to take on this research project, but I would not have reached this milestone without the help and support of many people to whom I would like to express my sincere thanks and gratitude.

I am grateful to the Nicis Institute, now called Platform31, Oost NV and the municipalities of Nijmegen, Rotterdam and Haarlemmermeer for providing financial support for the research programme ‘*Gebiedsontwikkeling: (her)ontwikkeling van werklandschappen*’ of which this PhD research was part. My profound thanks go to my supervisors Erwin and Rob for their constructive and insightful comments during the various stages of my PhD research. They granted me the freedom to shape this project according to my own vision. Erwin, thank you for opening up opportunities in as well as outside academia. I am also grateful to Pascal for his sound advice and valuable assistance in overcoming the methodological challenges associated with the research undertaken for this thesis, first as a team member of the joint research project between the Radboud University and the Netherlands Environmental Assessment Agency (PBL) entitled ‘*Herstructurering en ruimtelijke investeringen*’ and later as my co-supervisor and direct colleague in the Department of Geography, Planning and Environment.

I want to acknowledge my other colleagues at the Department and, most importantly, Yvonne, Jol and Gerda for their warm-hearted support and assistance. Fellow *Gebiedsontwikkeling* team members Bart and Jasper deserve special mention here. I enjoyed our discussions both on the research and the more important aspects of life. Without your collaboration in constructing the dataset the quantitative analyses reported in this thesis would not have been possible. Particular acknowledgement is also due to Arnoud for inviting me to once again explore new territories in the Gentrification 2.0 research project. To put it in assemblage terms, this project has offered me the opportunity to ‘deterritorialize’ my own research habits and practices. My thanks go to the

other team members of the joint research project between the PBL and the Radboud University, particularly Jan for our stimulating conversations and Hans, Marnix and Michel for their assistance in significantly enhancing the dataset by the addition of further data. I am indebted to the Dutch municipalities who so kindly provided access to their building permit extracts and responded to the survey used to collate information on regeneration activity. I would like to acknowledge the valuable help provided to us by the student assistants who compiled these data. I also very much appreciate the important contributions of Edwin and Friso to this PhD project. I am grateful as well to the colleagues at the Province of Gelderland, especially Barbara, for offering me the opportunity to experience how policy is made and implemented in practice.

I want to acknowledge my parents, Jan and Monique, my sister Michèle and my friends for their encouragement during this period, particularly the last two years. Special thanks to you Mam for taking the beautiful photographs that illustrate this book. And, finally, my deepest thanks go to my partner, Laura, for her love, support and patience. I very much look forward to being more 'present' in our new home.

Huub Ploegmakers, July 2015

1

INTRODUCTION



1.1 EFFECTIVENESS OF REGENERATION INITIATIVES ON INDUSTRIAL SITES

While *a priori* evaluation of the future impacts of plans and project alternatives forms an intrinsic part of decision-making on policies relating to the natural and built environment, *ex-post* evaluation that involves measuring the actual impacts and effects of such plans, programmes or projects is quite rare in the Netherlands. The National Audit Office has recently estimated that only 6% of all policies and programmes delivered by the Ministry of Infrastructure and the Environment (I&M), which has principal responsibility for spatial planning, transport and environmental policies, have been formally evaluated. It should be noted here that the National Audit Office did not assess the rigour of these evaluations, but only documented which policies and programmes had been subject to *ex-post* evaluation between 2006 and 2011. As a result, little is known about the effectiveness of these policies. The virtual absence of evaluations of spatial planning and transport policies can be explained by several factors, but the main difficulty facing evaluators in this policy domain is that it takes time for policy effects to build up. For some policy initiatives a six years time horizon was simply too short for any effects to be assessed (Court of Audit, 2012, 2013). Housing and neighbourhood renewal policies, which are funded by the Ministry of Interior Affairs (BZK), have only seen slightly more evaluation efforts, whereas the policies and programmes for the countryside delivered by the Ministry of Economic Affairs (EZ) are frequently evaluated (Court of Audit, 2013). However, this Ministry has also introduced policies that play an important role in shaping the built environment that have not yet been subject to rigorous analysis. The main focus of this research is the evaluation of one of these policies, namely regeneration programmes for rundown industrial sites.

The emergence of a comprehensive policy for the regeneration of rundown industrial sites can be traced back to the urban renewal programmes of the mid-1980s (see e.g. VROM, 1985, 1986). From the beginning of the 1990s, regeneration initiatives became part of a regional development strategy set out in the *Ruimte voor Regio*'s policy paper (EZ, 1995). The essence of this policy was the removal of supply side constraints, both on new and existing sites, which could help offset the shortages of land for business uses. Its successor, *Dynamiek in netwerken* (EZ, 1999), highlighted that regeneration initiatives could contribute to the improvement of the regional business climate. However, it was not until the early years of the 21st century that a comprehensive national policy was developed for the regeneration of rundown industrial sites.

In 2002, the national government introduced the first regeneration target requiring that 10,000 hectares of rundown industrial sites had to be improved in 2010. This comprised sites where decay had reached a stage that regular maintenance alone would no longer suffice. This figure represented some 17% of the total area of land allocated for industrial and business uses in the Netherlands (EZ, 2002). The target was driven by two important policy concerns. On the one hand, government thinking emphasized that firms' location decisions were increasingly influenced by the quality of the local business environment. On the other hand, the government recognized a growing public pressure to constrain business development on greenfield land. Following the change of government in 2003, an even more ambitious target was announced: the amount of land in need of improvement was raised from 10,000 to 21,000 hectares (EZ, 2004).

The *Integraal Bedrijventerreinen Informatie Systeem* (IBIS) provided the basis for this major upward revision.¹ IBIS is a survey, published on an annual basis, that gathers information from individual municipalities. It was launched in 1978 to record information on all industrial sites in the Netherlands, but updated in 2002 to enable monitoring of the extent of industrial land in need of physical improvement. It defined these sites by reference to four distinct processes of decline: (1) physical deterioration due to overdue maintenance; (2) functional obsolescence due to changing occupier demand requirements; (3) social obsolescence due to changing regulations (environmental, safety, working conditions); and (4) locational obsolescence due to changes in the immediate vicinity of the site (incompatible land uses). The IBIS survey subsequently became the main data source for tracking the amount of land in need of regeneration.

The mere setting of a regeneration target was not enough to solve the problems experienced at these sites, not least because successful implementation of this target depended crucially on the ability of local authorities (municipalities) to deliver physical regeneration in these areas. Although IBIS indicated that some 1,300 hectares had been improved between 2002 and 2006, the amount of land in need of improvements registered on the database had increased to 31,153 hectares, which amounted to three thirds of the total area of land allocated for industrial and business purposes. In other words, the rate of regeneration activity had failed to keep pace with the growth of sites suffering from some form of decline. One of the many reports published in this period even concluded that at this pace, regeneration

1 The IBIS survey reported that 29,001 hectares were in need of improvement. However, a study commissioned by EZ and VROM estimated that government intervention was only required on three quarters of the total amount of land that had to be improved (ETIN Adviseurs, 2003).

activity would continue into the 22nd century (Milieudefensie, 2007b, p. 4). This caused the national government to establish the Task Force (her)ontwikkeling bedrijventerreinen (THB, 2008), which had to develop recommendations to speed up regeneration activities.

At the heart of the Task Force report was the targeting of public resources and private investment at 15,800 hectares of core regeneration sites. This comprised industrial land, on which a mere facelift would not be sufficient to tackle the problems. Further, these sites had to remain allocated for business uses. The Task Force estimated that more than €6 billion, mainly public funding, was needed to finance necessary improvements of these sites. The government responded by setting a regeneration target of 6,500 hectares up to 2013. It also announced a long-term commitment to fund regeneration; €400 million would be provided until 2013, while subsequent funding was made conditional on progress towards this target (EZ & VROM, 2008). However, under the most recent administrative agreement between the national government and lower-tier governments (2011/2015), responsibility for regeneration policies has been effectively devolved to the provincial level. The national government decided not to commit additional expenditure on regeneration programmes, which was mainly due to increasing constraints on available budgets. This meant that all national funding programmes have expired as of January 2014.

Since the beginning of the 1990s the national government has made available specific grant funding to municipalities to encourage regeneration of rundown sites for industrial and business uses. Important examples include the *Stimuleringsregeling Ruimte voor Economische Activiteit* (StiREA) introduced in 1995, which was replaced by the *Tender Investeringsprogramma's Provincies* (TIPP) after five years, which itself was replaced by the *Topprojecten herstructureren bedrijventerreinen* (Topper) in 2004. In addition, a considerable amount of national government expenditure has been channelled through generic budgets like the urban policy programmes (*Grotestedenbeleid*) and the budget for the implementation of national spatial planning policy (*Nota Ruimte projecten*). Table 1.1 sets out the main funding streams over the period 2000/2013. Beyond these national funds, financial assistance is also available from the provinces and the European Union. These funds are made available to municipalities because they normally undertake physical regeneration activities. In fact, following the 1999 European Commission State Aid ruling, these kinds of financial support are no longer offered to private-sector investors because this could amount to unacceptable state aid (see EZ, 2000, 2004). Municipalities use these funds to finance a range of activities, including infrastructure improvements, investments in the public realm, relocation of undesired activities and the assembly and servicing of sites for redevelopment. Grants

normally require match funding from municipalities. In some instances, they even finance improvements of the site without reliance on such grants (see PBL, 2009a, chapter 4).

Table 1.1

Estimate of national government regeneration expenditure in rundown industrial sites between 2000 and 2013

FUNDING SOURCE	2000/2008 (€ MILLION)	2009/2013 (€ MILLION)
Grotestedenbeleid	140.0	n/a
Topper	81.0	107.6 ^c
Budget Bodemsanering ^a	– ^d	107.0
Tender investeringsprogramma's provincies (TIPP)	100.0	n/a
Nota Ruimte projecten	– ^d	100.0
Fonds economische structuurversterking (FES)	24.0	52.0
Europees Fonds voor Regionale Ontwikkeling (EFRO) ^b	– ^d	25.0
Kompas voor het Noorden	20.0	n/a
Brede Doeluitkering (BDU) - Economie	n/a	12.0
Total	365.0	403.6

a National grant programme for soil remediation. This grant also supports site remediation and clean-up on contaminated industrial sites.

b Match funding provided by the national government to the European Regional Development Fund.

c Formally, the Topper grant programme expired in 2008. This figure constitutes a second round of funding.

d Precise amount of expenditure unknown.

Sources: Court of Audit (2008), Convenant bedrijventerreinen 2010-2020.

Over the years, a number of evaluations have been commissioned to assess the effectiveness of national regeneration initiatives. Both StiREA, TIPP (Berenschot, 2004) and the Topper programme (Nicis Institute, 2009) have been evaluated. Generic policy reviews were also undertaken by the Council for Housing, Spatial Planning and the Environment (2006) and the National Audit Office (2008). However, these evaluations have tended to examine outputs rather than outcomes. The focus of reporting was essentially on the services that these grant programmes have been able to deliver, that is the number of hectares of land improved. The more important question of how the provision of these

outputs has affected the conditions on the sites targeted by these initiatives has received inadequate attention. This is also acknowledged by the authors of the most recent government-sponsored evaluation:

The Topper programme defines success by the number of hectares that have been improved. This performance indicator masks the underlying objectives of regeneration initiatives. The challenge is to establish indicators ('business environment', 'business climate', 'decline', 'high-quality sites') that really matter (...) The social problems that the Topper programme is meant to address (untidy, overdue maintenance, unsafe, unattractive to firms, slow growth rate etc.), which have actually been discussed at great length in a number of previous reports, should be at the centre stage (again). Regeneration is not an end in and of itself, but it is a means to produce certain social benefits (Nicis Institute, 2009, pp. 11-12; author's translation).

Clearly, the lack of a robust evidence base on the achievements of these national programmes did not prevent them from being terminated in 2014. Hence, an evaluation of the effectiveness of these regeneration policies is timely, if only because provinces and municipalities continue to finance improvements of rundown industrial sites.

1.2 REGENERATION AND INDUSTRIAL PROPERTY INVESTMENT

Integral to regeneration initiatives for rundown industrial sites is the premise that public investments in the physical environment are to pave the way for investment – preferably of much larger sums – by the private sector. Here government intervention is typically based on the concept of market failure – private sector investment would not otherwise occur without some form of public investment (see e.g. EZ, 2004, p. 11). Although regeneration initiatives are also aimed at attracting new investment by property developers and investors, the prime source of private finance targeted by these initiatives is firm investment. Firms are expected to change their investment behaviour, by locating at the site, by expanding their operations on the site or by maintaining and improving their premises. A study of local master plans for regeneration (described in more detail below) has revealed that local authorities share this view. One of the core assumptions embodied in the master plans is that policy-induced improvements to the physical environment will stimulate increased firm investment.

Some relevant examples include:

- Interventions are expected to provide an incentive for firms to undertake further investment at their current location (Municipality of Eindhoven, 2006, p. 26; author's translation).
- The municipality intends to invest in the public realm, but also expects entrepreneurs to undertake investment on their land and premises (Municipality of Utrecht, 2005, p. 52; author's translation).
- By ensuring that the designation of the area is maintained and by investing in the public realm, the government can stimulate investment by private land owners on their sites. This multiplier is essential for successful regeneration (Municipality of Groningen, 2005, p. 22; author's translation).
- The projects enable a flywheel effect to operate. That is, because the government takes the initiative, firms will see opportunities to invest in their premises and location (Municipality of Venlo, 2007, p. 29; author's translation).

Private sector investment will thus often take a tangible outcome in the form of investment in industrial and business premises. Consequently, understanding the operation of the industrial property market is essential in explaining why the private sector invests in regeneration areas or not.

Land made available on industrial sites is particularly important to manufacturing industries and warehousing, the traditional occupants of industrial space. In fact, more than 60% of all jobs in these sectors can be found on sites included in IBIS (Beckers, Schuur, & Traa, 2012). Other sectors (wholesale, repair and maintenance and ancillary office activity) have property and locational requirements that are often quite similar to those of manufacturing industries and a growing number of these firms ends up being located on industrial sites. In addition, local land use plans often permit office uses and retail warehouses, which provide accommodation for garden centres and DIY retailers, on land allocated for industrial and business uses. Thus, the boundaries between the traditional sectors of the commercial property market – industrial, retail and office uses – become increasingly blurred at the level of individual sites. However, the IBIS survey does not cover retail parks, regional shopping centres or locations developed for (higher-order) office uses only.

Unlike the office and retail sectors of the commercial property market, the majority of industrial buildings are owner occupied. An inventory by Stec Groep and NVB (2005) indicates that almost two thirds of all industrial space is owned directly by the users themselves. The industrial space covered by

this survey was mainly used for manufacturing (31%) and warehousing and distribution activities (22%), other use categories included wholesale trade and repair and maintenance. This implies that most industrial buildings have been built by or for its occupants directly and that there is little speculative industrial development. Normally, a firm buys land already serviced for industrial development and then arranges for a contractor to construct the building.

The fact that two thirds of industrial space is owner occupied suggests that refurbishment and redevelopment of existing structures will also be performed by the firms themselves. In the year 2008, at the onset of the global financial crisis, firms had spent nearly €3 billion on structures, whether new completions or refurbishment of existing ones, used for manufacturing and warehousing/distribution type of activities, while expenditure by commercial developers and investors on these property types amounted to less than 1 per cent of that sum (€1 million) (see Table 1.2). Since then this ratio has hardly changed. Investment performed by developers and investors was even close to zero in 2013. In contrast, property used for retailing (shops) and for business services (offices) has received more attention from these market actors.

Table 1.2

Total annual expenditure in business property (€ million) by use category and investor type

YEAR	MANUFACTURING ^a				WAREHOUSING AND DISTRIBUTION ^a				RETAILING AND REPAIRS ^a				BUSINESS AND PROFESSIONAL SERVICES ^a			
	occupiers ^b	%	developers ^b	%	occupiers ^b	%	developers ^b	%	occupiers ^b	%	developers ^b	%	occupiers ^b	%	developers ^b	%
1993	776	99	5	1	244	98	6	2	644	80	166	20	329	48	362	52
1998	1,092	88	150	12	517	94	31	6	1,154	85	201	15	377	23	1,232	77
2003	930	100	0	0	374	98	9	2	998	89	127	11	643	64	358	36
2008	2,027	100	1	0	972	100	0	0	1,360	93	110	7	1,101	58	803	42
2013	547	100	0	0	286	100	0	0	677	95	39	5	301	53	267	47

Notes: These figures do not include public sector investment.

- a** The type of use is defined with reference to the following NACE codes: C,D,E,F (manufacturing); I (warehousing and distribution); G,H (retailing and repairs); and J,K (business and professional services).
- b** The occupiers group consists of property commissioned by private persons, businesses and associations; the developers group incorporates property investment arranged by institutional investors (pension funds, insurance companies and banks), property developers and (building) contractors.

Source: Netherlands Statistics.

Evidence on the extent to which demand for new industrial space has been satisfied can be obtained from data on annual take-ups. Table 1.3 shows take-up rates (and absolute levels of take-up) of land allocated for industrial and business uses over the past two decades. Since market conditions may vary between geographical areas, the sample has been divided into three areas: those under high development pressure (due to high demand in these areas and more constrained supply), those with low demand and the remaining, intermediate areas. High pressure areas are in the Randstad region, the most densely populated area of the Netherlands. Low demand areas are in the northern provinces of the country, but also include areas in the southern parts ('national periphery'). Take-up rates are expressed as a percentage of the effectively available supply of land. Values below 30% provide evidence of an oversupply in the market, while values above 50% might signal an undersupply of industrial land (see Olden, 2010). The latter value corresponds to a readily available, two-year supply of land, a concept adopted by the Ministry of Economic Affairs (EZ, 2004) to manage land release. Take-up rates have increased in periods of high demand (late 1990s/early 2000s), but they only approached the two-year land-supply criterion. Strikingly, take-up rates were generally higher in the intermediate area compared to the Randstad area. This can be explained by the fact that this area comprises important growth regions in the provinces of Gelderland and Noord-Brabant. This suggests that in general there has been a sufficient supply of land allocated to industrial and business uses.

This overall picture is reinforced by information on price differentials between land uses (see Table 1.4). In 2013, land allocated for housing was around €320 per square meter, compared to about €120 for the more expensive land for industrial uses (the cheaper industrial land was about €100 per square metre). Thus, a significant premium exists for residential over industrial land, which signals the relative shortage of land for housing compared to industrial land (also see Pols, Van Amsterdam, Harbers, Kronberger, & Buitelaar, 2009). Nevertheless, industrial land prices will still command a net premium over the combined value of agricultural land and the servicing costs associated with converting it to industrial land.² Also, real prices of industrial land have increased by 42 per cent in the period 2005–2013, whereas residential land prices rose by only 22 per cent. Even so, this does not necessarily imply that the overall supply of land is falling relative to market demand (as can be seen from Table 1.3). Crucially, it might also reflect the way in which land prices are

2 Segeren, Needham, and Groen (2005) estimate servicing costs for industrial sites in the range of € 45 to € 55. On the basis of an analysis of financial appraisals of 75 development projects (including brownfield sites), Buitelaar and Witte (2011) report average servicing costs around € 45.

calculated by municipalities, who dominate supply in the industrial market (explained below). Finally, the use of aggregate data may mask the existence of shortages in particular areas. Indeed, Olden (2010) finds that there is considerable variation in the severity of local supply constraints. Supply is particularly constrained in the Green Heart, which refers to the less urbanized area between the four major Dutch cities of Rotterdam, The Hague, Amsterdam, and Utrecht. This is primarily because of lack of greenfield land caused by restrictive policies that aim to preserve this open area (see Van Eeten & Roe, 2000).

Table 1.3

Land take-up on sites allocated for industrial and business development

YEAR	PERIPHERAL AREA ^a		INTERMEDIATE AREA ^a		RANDSTAD AREA ^a		TOTAL	
	take-up (ha) ^b	take-up (%) ^c	take-up (ha) ^b	take-up (%) ^c	take-up (ha) ^b	take-up (%) ^c	take-up (ha) ^b	take-up (%) ^c
1993	334.0	16.1	313.6	20.5	175.5	19.8	823.2	18.3
1994	278.3	13.6	347.2	23.0	196.9	18.9	822.5	17.9
1995	414.3	21.2	431.4	28.0	226.1	20.4	1,071.8	23.3
1996	423.5	22.0	484.7	31.9	261.2	27.7	1,169.3	26.6
1997	470.9	27.1	586.5	39.3	308.9	31.9	1,366.3	32.6
1998	462.5	27.0	549.6	41.2	313.3	37.9	1,325.4	34.2
1999	518.6	30.9	567.4	53.9	293.5	45.2	1,379.5	40.8
2000	453.0	27.7	459.9	40.5	268.6	37.7	1,181.5	33.9
2001	438.8	26.8	251.6	23.5	161.2	21.5	851.6	24.7
2002	335.7	19.7	241.1	18.6	131.0	17.3	707.8	18.8
2003	205.1	11.4	162.6	12.7	172.8	21.2	540.6	13.9
2004	282.1	14.4	202.6	16.2	152.3	17.9	637.0	15.7
2005	307.7	16.0	202.1	16.0	133.3	13.5	643.0	15.4
2006	354.8	18.0	265.3	19.9	147.1	19.9	767.2	19.0
2007	378.1	20.7	307.7	19.6	197.6	12.4	883.5	17.7
2008	271.1	15.5	331.6	21.1	152.2	13.1	754.9	16.8
2009	157.3	8.3	161.7	11.1	111.0	9.7	429.9	9.6
2020	150.5	7.3	159.6	9.9	117.2	9.9	427.4	8.8
2011	128.0	6.1	127.3	8.2	77.9	6.0	333.2	6.7
2012	157.3	7.9	162.4	9.5	67.4	5.9	387.1	8.0
2013	131.5	6.0	139.9	7.3	131.5	11.7	402.9	7.7

a Areas as defined by Van Oort (2004) on the basis of a gravity model of total employment in the Netherlands.

b Annual amount of land taken up each year.

c Take-up expressed as a percentage of readily available stock of land.

Source: IBIS.

Table 1.4

Land prices (€ per square metre) for different categories of use

LAND USE	2005	2006	2007	2008	2009	2010	2011	2012	2013
agriculture	4.1	4.5	5.0	5.6	5.2	5.1	4.8	4.7	4.6
industrial ^a	99.9	103.7	102.3	105.5	114.1	119.8	125.3	124.5	122.3
residential	306.8	303.6	346.5	363.1	364.2	380.2	363.8	344.0	323.6

Notes: All values have been converted to 2006 prices using the Consumer Price Index (CPI).

^a Maximum asking prices for industrial building land.

Sources: Kadaster, IBIS.

From this evidence it can be concluded that different tiers of government have generally taken sufficient action to ensure an adequate and suitable supply of land on industrial sites. Concerns about land availability at the national level began to emerge from the early 1990s when a series of studies commissioned by the Ministry of Economic Affairs (see BCI and NEI, 1994; EZ, 1994) identified an imminent shortage of land for industrial and business uses. Responding to these studies, the government announced technical improvements in the forecasts that informed decisions about the quantity and location of land to be allocated for industrial development (EZ, 1995). Alongside this, more direct action was taken to boost supply. A specific funding instrument (StiREA) was introduced to support municipalities in overcoming supply-side blockages associated with physical regeneration in existing areas, as well as the development of new sites.³ Grant funding for the development of new sites was also available to municipalities because they usually carried out – and still do – land development on greenfield sites. These initiatives were motivated by the view that land shortages would seriously inhibit economic growth. The availability of an adequate supply of land for industrial uses was considered as an important means towards the achievement of the ultimate goal of promoting employment growth (EZ, 1995, p. 25). Successive governments have continued to stress the link between land availability and economic growth (EZ, 1999, 2004).

Interestingly, environmental interest groups began to highlight the negative impacts of what they perceived as an excess supply of industrial land during the second half of the last decade (see e.g. Olden & Louw, 2005; Milieudefensie, 2007a, 2007b; Stichting Natuur en Milieu & De Provinciale Milieufederaties, 2007). These groups managed to attract increased media

3 The StiREA programme has funded 36 new development projects and 32 physical regeneration schemes (Berenschot, 2004).

coverage and attention by academics and politicians. In particular, they added regeneration as an important reason for restricting the supply of land on greenfield sites. It was argued that the cheap and plentiful supply of land serviced for industrial development diminished the incentive for redevelopment and refurbishment of aging premises on existing sites. Constraining the supply of greenfield land would consequently help to reverse the process of decay in these areas (also see Council for Housing, Spatial Planning and the Environment, 2006; Gordijn, Renes, Traa, & Langeweg, 2007). The Task Force (2008) also drew attention to this relationship, arguing that regeneration could be encouraged by a more restrictive approach towards the development of new sites. In this respect, it saw an increasingly important role for (voluntary) cooperation arrangements between municipalities at the regional level in order to improve the coordination of the land provisions in local plans.

These widely shared concerns heralded a broadening of the goals articulated in national policy statements. An adequate supply of land was still seen as an important means to promote economic growth, but equal emphasis was placed on environmental quality and efficient use of land. The linkage between greenfield land release and the decay of existing industrial areas was also recognised:

Existing industrial sites are not always attractive enough for firms, for instance, because existing sites do not meet their specific requirements. Also, for firms looking for suitable space it is often cheaper and thus more attractive to locate at a newly completed industrial site. In other words: not all negative external effects are discounted in the price [of greenfield land]. Therefore, local authorities should assess the need for physical regeneration of existing sites in conjunction with the development of new industrial sites (VROM and EZ, 2007, pp. 4-5; author's translation).

In the annex to the policy paper that drew together the government's response to the Task Force, a similar claim was made:

The existing stock of industrial sites needs to be kept in good condition in order to reduce the flight of firms from old sites to new ones. Most firms will continue to prefer constructing a new premise at a recently developed location over refurbishing their existing land and buildings. This tendency contributes to vacancies and decay on older industrial sites (EZ and VROM, 2008, p. 6; author's translation).

This suggests that successful regeneration will be critically dependent on a broader range of, potentially conflicting, policy initiatives and actions impacting on the industrial property market. In fact, it has been argued that physical regeneration initiatives might be more successful in areas where there is a short supply of land relative to market demand (PBL, 2009a). Unfortunately, as with the impact of physical regeneration, the effects of these policies have been little researched and the claim that greenfield land release affects investment activity in existing industrial areas remains untested. Consequently, the extent to which subsequent changes in government policy, like the introduction of the *SER-ladder*⁴ in 2011, have been informed by evidence is rather limited.

1.3 RESEARCH AIM AND QUESTIONS

The purpose of this thesis is to evaluate the effectiveness of regeneration policies for rundown industrial sites in the Netherlands. Central to the research is the argument that sensible conclusions about the impact of regeneration initiatives on industrial property investment can only be drawn on the basis of a comprehensive assessment of the role of planning policies in determining levels of investment activity. Following Tiesdell and Allmendinger (2005), planning is broadly defined to include all *intentional* governmental interventions in the land and property development process intended to achieve desirable societal objectives. This broad conception of planning includes land use regulations and land policy, but also regeneration, transport and environmental policies. Transport policies influence firm location decisions and development activity, through the delivery of (national) transport infrastructure. So do environmental regulations concerning permissible levels of pollution, which are largely implemented through land use plans (referred to as Environmental Zoning). Government policies also indirectly influence the development process through fiscal measures. Buitelaar, Sorel, Verwest, Van Dongen, and Bregman (2013) demonstrate that at a general level

4 The *SER-ladder* was introduced to prevent unnecessary greenfield development and to encourage regeneration of existing sites. This instrument only allows greenfield development to be considered if all other possible sites have been ruled out. Prospective developers have to demonstrate that suitable sites are not available and, subsequently, that sites cannot be made available through redevelopment before proposing to develop a new site.

taxation and fiscal measures can have a significant impact on the commercial property market, through their effect on the price and the amount of property transactions. However, the government has made very limited use of these type of instruments in encouraging or discouraging specific forms of development. While the Task Force (2008) recommended in favour of an exemption from transfer taxes in regeneration areas, the government has not responded to this recommendation.⁵ Nor did it introduce other fiscal measures to influence the industrial land and property development process.

This research will not explore all these policies in equal depth and the main focus will be on land use planning and regeneration policies. Land use planning policies arguably have the most significant impact on the industrial land and property market. These policies can take many forms, like height controls, restrictions of building size and preservation designations, but the most important is planned provision of land (or lack thereof) for new industrial development. It is, thus, not surprising that the role of greenfield land release has been subject to the most intense debate. Transport and environmental policies will not be considered, except in passing.

The research is divided into two stages. The first stage looks at the way that planning policies are implemented (locally). Obviously, if a particular policy or programme is poorly implemented, or when there is no intervention at all, one would not expect it to be very successful in producing the intended outcomes. For this reason, Rossi, Freeman, and Lipsey (1999) argue that an assessment of the delivery of activities or services – commonly referred to as a process evaluation – is an essential adjunct to impact evaluation. This has also been recognized in the literature on the effects of planning policies and various attempts have been made to supplement quantitative assessments of the impact of land use planning with an analysis of the implementation process (see e.g. Monk & Whitehead, 1999; Bramley & Lambert, 2002; Bramley & Kirk, 2005). The second stage is concerned with measuring the impact of planning policies on outcomes in the industrial property market, and in particular levels of investment activity. Against this background, four research questions will be pursued in this thesis. The first two questions correspond to the first stage of the research and the last two questions reflect the second step of the research.

5 The Task Force also considered other fiscal measures such as a vacancy tax, a greenfield development tax and various types of fiscal relief. However, these measures are not included in the final recommendations due to problems relating to their effectiveness and practical implementation.

1 *How do municipalities determine the overall quantity and price of land to be made available for industrial development?*

The purpose here is to explore the way in which decisions about land release are made locally. The Dutch planning system is essentially decentralised, with the main decisions resting primarily with elected, local governments – municipalities. The primary means by which municipalities seek control over what can be built on any site is the local land use plan (*bestemmingsplan*). The land use plan is legally binding, which implies that all building applications that meet the requirements set down for a particular area must be granted planning permission and those that do not conform must be rejected. Because land use plans normally cover only parts of the administrative area of a municipality, land for industrial and business purposes will be made available through a number of different land use plans. Municipalities have since long recognized that simply allocating land for industrial purposes does not guarantee that it will be taken up for development. Therefore, they have pursued an ‘active land policy’. This active strategy implies that a municipality acquires land, divides it into building plots, services it with roads and other infrastructure, connects these services to local networks and offers the resulting building plots for sale. In other words, municipalities operate both as statutory planning authorities and land market intermediaries to satisfy the demand for industrial land.

Municipal control of the supply of land for industrial development implies that municipalities not only have a crucial role in affecting supply, but also in influencing the price at which building plots are offered for sale. Indeed, as noted earlier, many commentators have argued that processes of decay in existing areas are affected by both the generous supply of land and the cheap prices of building plots, which further reduce the incentive for redevelopment and refurbishment of aging premises. Therefore, a particular focus will be to understand how municipalities decide to increase the supply of land serviced for industrial development and the way in which they determine the price of the building plots they offer for sale.

2 Are physical regeneration initiatives being delivered in appropriate areas?

This question addresses whether regeneration initiatives are targeted in such a way that they can effectively achieve their goals. One of the important purposes of a process evaluation is that it allows one to distinguish implementation failure from failure of the intervention to produce desired effects. Several potential sources of implementation failure can be identified, but here the focus is on failure associated with the targeting of regeneration initiatives. It has been argued that area-based regeneration initiatives, and targeted economic development incentives in particular, will not be very successful if they are not delivered in the right places, that is, areas with the highest levels of economic distress (e.g. Peters & Fisher, 2004; Greenbaum, Russell, & Petras, 2010).

3 What is the impact of the planned provision for new industrial development on both new construction and refurbishment activity?

The pursuit of this question will facilitate a better understanding of how the supply of greenfield land affects investment activity in existing industrial areas. The analysis will cover investment in new built structures as well as refurbishment or redevelopment of existing structures. As such, this question allows for a direct test of the claim that increased greenfield land release contributes to the decay of existing urban areas. In addition, the availability of land will be analyzed at the level of individual sites to explore the extent to which planning authorities exert control over which building plots actually get developed.

4 Are physical regeneration initiatives having the desired effects?

The fourth and final question seeks to draw conclusions about the effectiveness of regeneration initiatives. This research takes a particular interest in determining whether publicly funded improvements of the physical environment have actually paved the way for private sector investment in industrial property. However, since regeneration initiatives generally pursue a broader set of objectives, the evaluation will also examine changes in other outcome measures on which effects are expected to occur.

1.4 EVALUATING PLANNING POLICIES

It has been long recognised in planning theory and practice that *ex-post* evaluations of planning effectiveness are scarce and this is often criticized as a major shortcoming in the planning literature (Alterman & Hill, 1978; Calkins, 1979; Talen, 1996a, 1996b; Laurian et al., 2004; Brody & Highfield, 2005; Alexander, 2009). Although other barriers have been identified as well, this ‘evaluation gap’ (Laurian et al., 2010) appears to be caused primarily by a lack of a generally accepted methodology for attributing changes in observed outcomes to planning activities. Isolating the impact of planning decisions on the natural or built environment is a demanding task since there are many other social, political, and economic influences outside the control of the planning system. Healey (1986, p. 114) asserted that this issue, what she called multi-causality, poses a major problem when evaluating the effects of particular planning policies or types of intervention. More recent studies have also highlighted that this is one of the most challenging issues inherent to planning evaluation (e.g. Carmona & Sieh, 2008; Mason, 2008; Wong & Watkins, 2009; Laurian et al., 2010; Rae & Wong, 2012; Wong, 2015).

Talen (1996b, 1997) even asserts that due to the presence of multi-causality, planning evaluation can only strive to ascertain associations between plans and outcomes. This limits the analysis to an investigation of goal achievement:

[T]he question to be addressed is more black and white: did the plan achieve its goals or not? This is a question quite different from one which attempts to gauge whether or not planners were responsible for creating a particular urban development form (1997, p. 580).

Similarly, Wong and Watkins (2009) argue that the measurement of the effectiveness of planning should not distinguish between outcomes and impacts. Here, impacts are the effects solely attributable to the planning system, whereas outcomes are defined as ‘*the combined effects on socio-economic and environmental changes brought by the planning system and other forces*’ (p. 489). This distinction is similar to that between gross outcomes and net effects, which is often used in the generic evaluation literature (see e.g. Rossi et al., 1999). By focusing on outcomes, as opposed to impacts, the question of whether observed outcomes are a product of planning policies will be left unanswered.

The studies discussed above have been essentially concerned with assessing how effective spatial plans have been in *shaping* decisions made by other (market) actors. Acknowledging that plans largely work by persuading other actors to follow or implement the plan-maker's vision, they adopt a conformance-based perspective on evaluation. This perspective implies that a plan is considered successfully implemented if actual development patterns adhere to the stated objectives and intentions expressed in the plan.⁶ As such, planning is conceptualised rather narrowly as the production and implementation of spatial plans, although it is recognized that effective plan implementation often depends on the deployment of other instruments. Rae and Wong (2012), for example, explicitly differentiate (spatial) planning evaluation from evaluations of area-based regeneration initiatives, arguing that the problems associated with attributing change to the policy under consideration are more acute in planning evaluation (see Laurian et al., 2010 for a similar argument).

However, the broad definition of planning adopted in this research implies that (physical) regeneration policies are as much part of planning as the production of strategic plans or land use and zoning plans. Drawing on the conceptual framework developed by Tiesdell and Allmendinger (2005) and subsequently revised by Adams and Tiesdell (2010, 2013), market *shaping* instruments can be distinguished from market *regulation* and *stimulus* instruments. Whereas market *shaping* instruments, which work primarily

6 Alexander (2009) identifies two additional approaches to planning evaluation: performance-based and utilitarian (or quasi-utilitarian) evaluation. Performance-based evaluations assess the usefulness of a plan in guiding and informing subsequent decision making, irrespective of whether there is conformance between the plan and final outcomes (Faludi, 1989; Mastop, 1997; Faludi, 2000 and see Mastop & Needham, 1997 for a review of empirical studies). As such, criteria of implementation success refer to how a planning document fares during negotiations, whether decision-makers use it, whether it helps clarifying choices and whether (without necessarily being followed) the document forms part of the definition of subsequent decision situations (Faludi, 2000, p. 306). Utilitarian evaluations seek to assess whether government interventions maximize total social benefits. Evaluation methods based on quasi-utilitarian principles combine a utilitarian approach with substantive value-related rationality. These evaluations are normally used for estimating the projected future impacts of plans or project alternatives and well-known examples include Cost-Benefit Analysis (utilitarian), Environmental Impact Assessment (quasi-utilitarian) and Hill's (1968) Goals Achievement Matrix (quasi-utilitarian). Methods like cost-benefit analysis and cost-effectiveness analysis can also be applied for ex-post assessments of programme efficiency (Rossi et al., 1999).

through the preparation of spatial plans⁷, influence the context for market actions and transactions by providing information and reducing uncertainty, market *regulation* instruments affect market actions and transactions by restricting the set of choices available. Market *stimulus* instruments, such as fiscal measures and the provision of public infrastructure and serviced land, make some actions more (or less) advantageous. This thesis is primarily concerned with isolating the impact of *stimulus* instruments, especially those instruments designed to encourage investment in particular areas, from *regulatory* instruments.

In the fields of urban economics and economic geography, a voluminous literature has developed that seeks to assess the impact of *regulatory* instruments on economic performance. Economists have been more ambitious than planners with respect to attributing observed outcomes to planning activities in arguing that they can provide ‘unambiguous’ causal evidence of the impact of the planning system (Hilber & Vermeulen, 2010). This literature will be reviewed in the next section. There also is an extensive literature on appropriate evaluation approaches for assessing the effectiveness of regeneration policies. This research will also draw from this literature and it will be considered in the subsequent section.

1.4.1 ASSESSING THE IMPACT OF REGULATORY INSTRUMENTS

In recent years, there has been much interest among researchers engaged in the study of land and property markets to account for the role of institutions in explanations of market outcomes (such as prices and levels of new development). For example, Lai and Hung (2008) have deduced a theoretical framework from the ideas outlined in Ronald Coase’s seminal paper ‘*The problem of social cost*’ to study the impact of institutional arrangements on price, quantity, and quality dimensions of real estate markets (see Lai, Wong, Ho, & Chau, 2008; Lai et al., 2009; Lai, Wong, & Chau, 2011 for empirical applications). In addition, there have been attempts to integrate and apply insights from different strands of institutional analysis (see Ball, 1998 and Adams, Dunse, & White, 2005a for critical discussions of different institutional approaches in property research). Needham, Segeren, and Buitelaar (2011), for instance, explore how institutions can be taken into account in theories of land markets using insights from new institutional economics and ‘old’ institutional analysis. They conclude that incorporating institutions in the analysis facilitates

7 Shaping markets also involves the reform of property rights.

a better understanding of particular markets, although this understanding will be necessarily limited to that land market at that time. There is resonance here with the work of Adams, Leishman, and Watkins (2012) that seeks to develop a more institutionally grounded notion of land markets, emphasizing the social and cultural embeddedness of market actors.

However, there is one particular institution that has long been acknowledged in the literature, even if it has generally not taken an explicitly institutionalist stance: the regulation of property rights through the planning system (Ball, 2002, p. 1462). In fact, most authors who have examined the economic effects of planning regulations have adopted a neo-classical approach (White & Allmendinger, 2003; Adams & Watkins, 2014). Interestingly, though, many researchers in the US acknowledge that the most relevant conceptual ideas can be traced back to the work of Fischel (1985), which is closely aligned with the tradition of new institutional economics.⁸ Although there are a growing number of studies examining the impact of planning on commercial property markets, the literature largely focuses on the impact of planning on the housing market.

The central argument is that planning regulations may have benefits as well as costs. By internalising negative and maximizing positive externalities and correcting market failure through the delivery of public goods and infrastructure, land use regulations create benefits. On the other hand, they impose a constraint on the supply for particular types of development in particular types of location. Different planning systems may restrict the supply of different attributes of the built environment, but any regulatory instrument that curtails urban expansion, limits allowable densities or controls building heights necessarily restricts the supply of land or space (Cheshire, 2013).⁹ Regulations may also constrain supply by rendering development nonviable. High costs may be imposed through planning agreements and impact fees. In addition, there are the transaction costs arising from the operation of the planning system (delays

8 Other contributions are provided in Brueckner (1990, 2000, 2001) and Quigley and Rosenthal (2005). In the UK, theoretical contributions on the economic consequences of planning regulations are associated with Evans (1973, 1983, 1991), Bramley et al. (1995) and Jones and Watkins (2009).

9 The planning system in Britain explicitly restricts the amount of land available for urban development, as in the Netherlands. However, while the planning system of the Netherlands – and many other Western European countries – is based on the principle of legal certainty, the UK system is essentially discretionary. This means that plans are not considered legally binding, which enables greater flexibility in granting planning permission. With just a few exceptions, such as urban growth boundaries (UGBs) in Portland, the US system does not restrict the supply of land. In contrast, local authorities control development by means of subdivision rules and minimum lot size requirements (see Quigley, 2007 for a discussion of other land use regulations in the US).

and fees). Supply may also be directly affected by the regulatory process. Mayo and Sheppard (2001) have demonstrated that the UK system of development control makes market supply more inelastic, simply because the planning permission process becomes more uncertain in its outcomes. In addition, Ball (2011) has argued that planning delay may be a significant contributory factor to the low responsiveness of UK housing supply. By reducing the quantity of supply for a particular use in a particular location, restrictions will increase the price of buildings for any given level of demand. Restrictions may also increase price volatility, especially during market upswings, by affecting the responsiveness (elasticity) of supply (see e.g. Glaeser, Gyourko, & Saiz, 2008; Hilber & Vermeulen, forthcoming). In the British context, where the planning system essentially constrains the supply of urban land, it has also been argued that restrictions lead to higher densities. Rising building prices lead to rising land prices as developers compete for the scarce available land and bid up its price. This encourages them to build at higher densities, so that apartment buildings rather than houses are built (Evans, 1991; Jones & Watkins, 2009).

While theoretical contributions consider both the costs and benefits produced by planning regulations, empirical applications have almost exclusively focused on the costs imposed by planning restrictions.¹⁰ In fact, several authors have argued that observed price increases may well be because of positive amenities that planning provides for local residents (Mayer & Somerville, 2000a; Bramley, 2013). Empirical applications have used increasingly sophisticated econometric techniques to isolate the impact of planning regulations from other influences. According to Bramley (2013) econometric models have followed two traditional approaches: micro hedonic price models, which are generally cross-sectional, and more aggregated time series modelling, which has placed more emphasis on modelling of the supply side. The latter type of research, is increasingly conducted at lower levels of spatial aggregation (i.e. local authorities) and has begun to make more use of panel data. Elsewhere, Bramley has argued that these studies are still relatively aggregated and that there is considerable scope for more micro-level modelling of supply. Ideally, such research should be undertaken at the neighbourhood level or the level of individual sites (Bramley & Kirk, 2005; Bramley & Leishman, 2005; also see Dawkins & Nelson, 2003; Meen & Nygaard, 2011).

10 The research by Cheshire and Sheppard (2002) represents a rare attempt to measure the net welfare costs of planning regulation. In addition, there is a substantial hedonic literature that seeks to value the amenities generated by land use regulations (see McConnell & Walls, 2005 for a review of the benefits of open space).

The theoretical contributions discussed above can construct a counter-factual world without planning restrictions to conceptualize the impacts of imposing such restrictions, but empirical research cannot normally replicate this analysis. In many countries, the planning system applies everywhere. Furthermore, it will often be in place throughout the entire study period. Therefore, it is very difficult, if not impossible, to establish a counter-factual position (Adams & Watkins, 2002). Against this background, Monk and Whitehead (1999) provide a rare alternative approach to examine the impact of planning policies. They suggest a behavioural mode of analysis, which supplements quantitative data on actual market outcomes (prices, development activity) with qualitative material gained from a detailed investigation of the behaviour of planners, land owners and developers. An advantage of this approach is that both outcomes and the processes through which these outcomes are achieved can be examined. This enables conclusions to be drawn about how regulations establish a set of incentives and constraints that alter behaviour of market actors in certain ways. More recently, Adams and Watkins (2014) have also called for more detailed investigations of the behaviour of different market actors in order to facilitate a better understanding of how planning influences the decision environments within which these actors make decisions.

1.4.2 EVALUATING URBAN REGENERATION

There has been widespread international interest in evaluating urban regeneration policy¹¹ and as a result a voluminous literature has developed on this topic. This literature can be differentiated on the basis of the evaluation question being asked. Basically, two questions have been asked: one directed towards accountability: ‘Does the policy work?’, the other geared towards policy improvement: ‘How does the policy work?’. The US-based literature has been mainly concerned with answering the first evaluation

11 In the UK the term area-based initiatives is frequently used to denote regeneration activities. In the US such initiatives are often referred to as spatially targeted or place-based policies. Four broad categories of regeneration activity can be identified, namely business incentives, training and education, physical interventions and social measures (Ho, 1999; Tyler, Warnock, Provins, & Lanz, 2013). Physical improvement is an obvious example of market stimulation, but business incentives – tax instruments, as well as non-tax incentives such as development grants – may also have some form of land and property dimension. Tyler et al. (2013) categorize physical activities into two broad groups: 1) activities undertaken in business and industrial areas like the provision of infrastructure and commercial property and 2) public investments in residential areas, which may include new construction, demolition and redevelopment of housing and the delivery of public space.

question, particularly in relation to spatially targeted economic development programmes. Bartik (2004) highlights the main conceptual challenges that exist in evaluating the impact of these kind of policies. Since these programmes are targeted at distressed areas, these areas are – by their very nature – likely to have higher levels of economic distress than areas that are not targeted by the initiative. Any study that compares the levels of economic outcomes for targeted areas with some comparison group is therefore likely to be biased towards finding negative effects of the programme, since levels of economic outcomes will be correlated over time – a problem known as selection bias. Absent experimental data, Bartik (2004) suggests that a variety of, not necessarily mutually exclusive, econometric evaluation methods can be used to address selection bias. These are: standard linear regression methods, ‘difference-in-differences’ estimation (DD) and methods that explicitly model the selection process such as propensity-score matching and instrumental variable methods.

Enterprise Zones, which offer a variety of tax incentives to businesses located in these zones, probably are the most extensively evaluated spatially targeted economic development programmes in the US. A number of studies have attempted to evaluate Enterprise Zones by comparing the performance of enterprise zones to comparable non-designated areas using propensity score matching (Bondonio & Engberg, 2000; Greenbaum & Engberg, 2004; Bondonio & Greenbaum, 2007), although more recent research has also employed alternative methods (see Neumark & Kolko, 2010). Tax Increment Financing (TIF) districts have also been subject to rigorous analysis. These studies have utilized a range of different econometric methods such as DD estimators (Byrne, 2010), propensity score matching (Smith, 2009; Lester, 2014) and instrumental variables (Weber, Bhatta, & Merriman, 2003). Outside the US, propensity score matching methods have been used to assess the New Deal for Communities programme (NDC) in the UK (Gutiérrez Romero, 2009) and neighbourhood renewal policies in the Netherlands (Wittebrood & Permentier, 2011; Permentier, Kullberg, & Van Noije, 2013).

Many evaluations of urban regeneration in the UK have sought to respond to the second evaluation question by applying a theory-driven approach (see e.g. Ho, 1999; Rhodes, Tyler, & Brennan, 2005; Tyler et al., 2013). This approach has been developed by researchers working in the field of programme evaluation (see e.g. Chen & Rossi, 1983; Chen, 1989, 1990; Weiss, 1997) and the realist evaluation introduced by Pawson and Tilley (1997) also belongs to the school of theory-driven evaluation. The theory-driven approach arose out of dissatisfaction with the classic evaluation design – the randomized controlled experiment. Criticism centred on the claim that while the classic evaluation design gave valid estimates of programme effects it could not explain

how the programme produced those effects, thus leaving the workings of the programme a ‘black box’. In response, theory-driven evaluation seeks to elicit the expectations and assumptions underpinning a programme with respect to how the programme is supposed to work. These conceptualisations consist of all the cause-and-effect sequences by which programme services and activities are expected to produce the desired social benefits. The approach also stresses the need to take into account the assumptions and expectations about what the programme must do to provide the intended services, which, in turn, are expected to bring about the desired effects. Several synonyms have been used to describe these conceptualisations, including programme theory (Chen, 1990), theory of change (Pawson & Tilley, 1997; Weiss, 1997) and policy theory (Hoogerwerf, 1990). If the assumptions embodied in that theory about how the intended benefits are brought about by the policy or programme are flawed, the intervention will fail no matter how well it is implemented. The starting point in most evaluations of regeneration initiatives is to begin by establishing this programme theory and subsequently devise a research methodology to test the validity of the theory in practice.

1.5 EVALUATION APPROACH

1.5.1 EVALUATION METHODS

Having discussed the conceptual and methodological frameworks that are applied in the literature on the evaluation of planning policies, this section outlines the research approaches that are used in this thesis to assess the impact of planning policies on the performance of the industrial property market in the Netherlands. Different methodological approaches will be employed to answer the research questions identified in the third section. This is summarised in Table 1.5.

Table 1.5
Research questions and evaluation approach

RESEARCH QUESTIONS	EVALUATION APPROACH	METHODS
1. How do municipalities determine the overall quantity and price of land to be made available for industrial development?	Process evaluation	Interviews
2. Are physical regeneration initiatives being delivered in appropriate areas?	Process evaluation	Statistical analysis
3. What is the impact of the planned provision for new industrial development on both new construction and refurbishment activity?	Impact assessment	Statistical analysis
4. Are physical regeneration initiatives having the desired effects?	Impact assessment / Programme theory explication	Statistical analysis / Document analysis

The purpose of the first research question is to undertake an analysis of the process by which land use plans are implemented. Following Monk and Whitehead (1999), a behavioural approach is adopted to explore how municipalities make decisions to increase the supply of land for industrial development and also as a means of examining how they determine the price of the land they offer for sale. This analysis draws from insights generated through qualitative research that involved in-depth interviews with municipalities. The second research question seeks to examine the factors influencing the designation of regeneration areas so as to establish whether initiatives are being delivered in the right areas. An econometric model is developed for analyzing and estimating which factors influence the likelihood that a site will be subject to regeneration initiatives. Because the dependent variable is dichotomous in nature (i.e. 1 = intervention, 0 = no intervention) a logit analysis is used to estimate this model.

The last two research questions are concerned with assessing the impact of land use planning and regeneration policies respectively. The basic aim of an impact assessment is to produce an estimate of the net effects of an intervention – that is, the changes on outcome measures that can be attributed solely to the intervention, free and clear of the influence of any other confounding factors that may also influence outcomes. As a result, issues of internal validity have been one of the main concerns in the evaluation literature. Classic experimental designs are generally thought to be most powerful in dealing with factors that jeopardize internal validity (see Campbell & Stanley, 1963). As this thesis investigates the effectiveness of ongoing policies and initiatives, which have been in operation for a substantial period of time, it is not possible to use a classic experimental design in which sites are randomly assigned to a ‘treatment’ group, that is subject to regeneration, and a control group, from which the intervention is withheld. The prospects of using such a design to answer the third research question are further constrained because the planning system applies everywhere in the Netherlands. As a consequence, there will be no areas available that are not subject to these policies, which could serve as controls. Instead, statistical methods will be employed for isolating the effects attributable to the policies in question. Statistical approaches are often considered next to best to randomized designs in dealing with threats to internal validity (Campbell & Stanley, 1963; Rossi et al., 1999).

The third research question will be addressed by exploiting ‘natural variation’ in planning regulations, which arises because the Dutch planning system is not uniform over space or time. The extent of restriction applied by land use plans and regulations on new industrial development varies locally, as Olden (2010) has shown. Thus, while it may not be possible to assess what the net effects of planning regulations are (as compared to no regulations at all), it is possible to assess the effects of differences in restrictiveness. For this purpose, an econometric model of investment activity in industrial buildings is developed and estimated that incorporates several measures of planning restrictiveness. In contrast to existing studies that explore the supply-side impact of land use regulations at the city or regional level, this research conducts an analysis at the level of individual sites. Given the nature of the dependent variable a mixture of discrete and continuous variable modelling is used (as suggested in Bramley & Leishman, 2005).

Table 1.6
Judgmental assessments by municipal policy officials of the impact of regeneration policies

OUTCOMES	STIREA (N=18)	TIPP (N=41)	TOPPER (N=23)
Job creation	78%	17%	43%
Job retention	50%	37%	n/a
Attraction of businesses	33%	7%	39%
Retention of businesses	17%	12%	30%
Environmental quality improvements	50%	68%	57%
Accessibility improvements	44%	61%	57%
Property value increase	11%	5%	39%

Notes: The figures represent the percentage of respondents indicating that regeneration initiatives had a positive impact on these outcome measures. Regeneration activities were undertaken in less than half of all initiatives financed by the StiREA programme. The figures reported for this programme are thus likely to overestimate the effects of regeneration.

Sources: Berenschot (2004), Nicis Institute (2009).

The fourth research question could be addressed by interrogating local authorities about their impressions of the impact of regeneration policies. Although previous evaluations have principally focused on output delivery, some studies have conducted surveys with policy staff to supplement output measures with outcome information (see Table 1.6). For example, drawing on a survey of policy officials, the evaluation study by Berenschot (2004) reported that the TIPP programme would stimulate the creation – and retention – of thousands of jobs. However, it will be extremely difficult for the staff responsible for these initiatives to make judgments about net effects because the necessary information for making such judgments is ordinarily lacking. This was also admitted by the team of evaluators that undertook the TIPP evaluation. Moreover, policy officials clearly have some incentive in making their efforts seem successful. Surveys of firms located on the sites that are subject to regeneration could also be used to get an idea of the success of these initiatives. But yet again, it will be difficult for these actors to make judgments about net effects. Indeed, such surveys are better suited for revealing how the activities undertaken on the sites concerned have affected firm behaviour (Bartik, 2004). Rather, as noted above, this thesis relies on statistical methods to obtain estimates of the net effects of regeneration initiatives.

The model that is employed to estimate the impact of planning regulations on investment activity also includes regeneration initiatives as one of the key independent variables, which allows for an assessment of the contribution of these policies over and above that associated with the other (control) variables. This thesis also utilizes an alternative, two-stage procedure to assess the impact of regeneration initiatives in which the first step is to explicitly model the selection process as a means of offsetting selection biases. To this end, a model is developed that predicts the probability of regeneration activities being undertaken on a particular site. This model, generally known as a selection model, is similar to the one applied to address the second research question.¹² The results of this analysis are used to match regeneration sites to control sites on the basis of those characteristics that caused sites to be targeted by regeneration. This method is known as propensity score matching (Rosenbaum & Rubin, 1983, 1984). To gain a better understanding of the basic rationale on which regeneration policies are based, the main assumptions and expectations about how they are supposed to work are elicited from policy documents. The evaluation methodology just outlined will be used to test the validity of this underlying programme theory.

1.5.2 COLLECTION OF DATA

This research employs diverse research methods to explore the way in which planning policies impact on the industrial property market. Document analysis is used to make explicit the causal reasoning regarding how regeneration activities are expected to produce desired outcomes. Policy documents were also studied to identify precisely what those desired outcomes are by reviewing goal and vision statements. The analysis is restricted to master plans that were submitted by municipalities in order to qualify for the Topper programme. These documents are chosen because they are readily available for all regeneration initiatives funded by this programme as the submission of a master plan was a formal requirement to qualify for funding. It appears that the content of these documents is generalizable across other initiatives because the results of the analysis are largely consistent with previous qualitative research that included interviews with policy officials (RIGO, 2000; Berenschot, 2004; PBL, 2009a). Schemes that qualify for the grant programme do, however, differ from

12 Rossi et al. (1999) argue that the information contained in selection models can be very interesting in its own right as part of a comprehensive evaluation, because it will reveal important factors that influence the likelihood that individuals (or areas) are served by a particular programme or policy.

other initiatives in that their focus is more heavily on land assembly and site servicing, alongside infrastructure and public realm improvements.

The research makes use of evidence generated from a series of interviews with municipalities to explore the implementation process of land use plans. The research concentrates on municipalities in which a minimum of 100 hectares of industrial land registered in IBIS have been taken up of development. Three quarters of the total amount of land available on industrial sites is located within the administrative boundaries of these authorities. From this sample, 24 municipalities were chosen to participate in semi-structured interviews. The selection process ensured equal representation across high and low-demand regions and the remaining, intermediate areas. To further improve the representativeness of the research, the remaining 126 municipalities were asked to complete a standard structured questionnaire, during a telephone interview. Some 64 municipalities responded to the questionnaire – a 51% response rate.

Central to this thesis is a large new and unique dataset that was created within a collaboration between the Radboud University and the Netherlands Environmental Assessment Agency (PBL) undertaken as part of a project entitled '*Herstructurering en ruimtelijke investeringen*' (Regeneration and spatial investments). This research draws on the IBIS survey as the primary source of information. The IBIS database maintains records of all sites for industrial and business uses larger than one hectare, with a set of attributes of the site attached (e.g. land availability, asking prices of building plots, industrial site category, and location). Importantly, each site is assigned an unique and permanent identification number, which makes it possible to follow individual sites over time. IBIS is the main data source for tracking the stock of land on industrial sites and various measures of planning restrictiveness, relating to the amount of available land, can be derived from this database. Since a detailed investigation of the quality of the original IBIS dataset led to several questions about its reliability, this study makes use of a file modified by the PBL for the period 1997/2008.¹³ The research project sought to enhance this basic dataset by obtaining and incorporating a number of additional variables, derived from secondary, as well as primary sources.

One of the challenges was to collate information on the presence of physical regeneration initiatives. There is no standard for reporting information associated with regeneration activity. Even though IBIS tracks the amount of land in need of improvement, as was noted above, it does not contain reliable

¹³ These modifications are described in Appendix B of Beckers et al. (2012). This dataset has been further modified to account for the fact that some sites have changed over time with older sites being absorbed in other existing sites and splitting of originally larger sites. The identifiers of the sites concerned were manually adjusted to create a set of constant sites that could be used to compare data over time.

information on the sites that were actually subject to regeneration, although this seems to have changed for the most recent editions of the survey. Therefore, a questionnaire was administered to all municipalities with at least one industrial site within their administrative area according to the 2008 IBIS survey. Respondents were asked to provide information on the occurrence of interventions, the regeneration period and project features (type of activities, financial value). Some 181 out of 435 selected municipalities responded – a 42% response rate. More than half of all industrial sites that existed from 1997 through 2008 could be found within the boundaries of these municipalities. The sample thus provides reasonable coverage.¹⁴ There is no reason to believe that the initiatives that are tested are different from contemporary ones, because the type of activities undertaken on rundown sites have not changed much. Regeneration initiatives still focus essentially on infrastructure and public realm improvements (see ARCADIS, 2013).

Another key challenge was to obtain a valid outcome measure of investment activity in industrial buildings. This thesis utilizes data on individual building permits, which allows for an analysis at a small geographic scale. Although owners can legally make modest changes to building structures without first obtaining a permit, any substantial alterations to existing buildings require a building permit.¹⁵ Obviously, new construction projects will also require a permit. As permit data are not readily available, municipalities were asked to provide access to their building permit records. Again, the sample was based on all municipalities included in the IBIS database. On the basis of the extracts of building permit records from 57 municipalities (13% of the total sample) a longitudinal dataset has been created that contains all building permits issued between 2004 and 2008.¹⁶

Data from two other primary sources have been incorporated to provide control variables. One is an age variable, constructed by visually inspecting historical maps for the period 1950–1990 to determine when sites have become occupied by industrial uses. The other is a variable that establishes the presence of industries with a large environmental impact. This measure is derived from

14 Comparison with the total population of industrial sites in IBIS indicates that the sample over-represents sites with a larger number of business establishments in urbanized areas. The average number of establishments in the regeneration sample is 55, while the average number of establishments on the sites not in the sample is 41, a statistically significant difference. The sites incorporated in the sample do not differ significantly from other sites in terms of their mean size, the amount of land available for development, the share of large firms and the age of the site.

15 The type of building work that does not require a building permit is detailed in Appendix II of the 'Besluit omgevingsrecht' and previously in the 'Besluit bouwvergunningvrije en licht-bouwvergunningplichtige bouwwerken'.

16 Again, this sample is biased towards urbanized areas and sites with more business activity.

a list provided by the Association of Dutch Municipalities (VNG, 2007). This list divides business activities into six classes on the basis of their (potential) environmental impact in terms of noise, odour, dust and major industrial hazards such as fire and explosion. As this list distinguishes business activities on the basis of their NACE-codes this information could be merged to the LISA (*Landelijk Informatiesysteem van Arbeidsplaatsen en Vestigingen*) database. LISA is a longitudinal database that covers all business establishments in the Netherlands and includes information on the number of jobs in each year, industry type (NACE-codes) and establishment location (exact street address). Some of the outcome measures used to evaluate the impact of regeneration initiatives are taken from this dataset. Other outcome measures were derived from a database on taxation values for tax purposes maintained by Netherlands Statistics (CBS). These measures relate to commercial property values. These outcomes measures are selected because they accurately represent the main goals and objectives of regeneration policies.

1.6 RELEVANCE

Although the need for this work is grounded within recent policy debates in the Netherlands, the findings of this study are equally relevant for academics and practitioners elsewhere. In many countries governments are increasingly seeking to ensure greater involvement of the private sector in the delivery of regeneration in derelict and rundown industrial areas. Government intervention in these areas is typically discussed in terms of brownfield redevelopment. In the US and Canada, brownfield land is synonymous with contamination. In Europe, a brownfield site is one which has already been built upon, but not necessarily contaminated. These sites include both vacant land and land still in use with potential for redevelopment to other purposes (Adams, De Sousa, & Tiesdell, 2010; Schulze Bäing & Wong, 2012). The industrial sites that are subject to regeneration activities in the Netherlands differ from brownfield sites in the sense that these areas are not necessarily derelict or contaminated. In addition, the majority of schemes – and all the initiatives evaluated in this thesis – are not directed at re-using the site for other uses (see ARCADIS, 2013). In other countries, initiatives to regenerate industrial and commercial areas need not be confined to brownfield locations either. In the US, the physical improvements associated with tax increment financing (TIF) are often focused at areas that remain zoned for business purposes (Smith, 2009; Squires, 2012). For the UK, Tyler et al. (2013) estimate that by the end of the last decade, improvements to industrial and commercial property and infrastructure accounted for over 11% of total regeneration expenditure.

Despite the extensive use of public investments in regeneration areas as a means to attract private sector investment, there is little evidence available on the effectiveness of these policy initiatives in leveraging private finance. Most previous studies (see e.g. Adair, Berry, Deddis, McGreal, and Hirst (1998), Adams, Disberry, Hutchison, and Munjoma (2001), Dixon, Pocock, and Waters (2006) for the UK; and De Sousa (2000), Wernstedt, Meyer, and Alberini (2006), Siikamäki and Wernstedt (2008) for the US and Canada) have focused on the barriers and drivers of urban regeneration, and particularly brownfield redevelopment, rather than on its policy impacts. Where the achievements of regeneration policies are explored, most studies (see Tyler et al., 2013 for a review of UK-based evaluation evidence) have tended to analyze physical outputs, such as the number of hectares reclaimed or the amount of floor space provided by the public sector. Elsewhere, a series of studies (Adair et al., 2003; Adair et al., 2005a; Haran, Newell, Adair, McGreal, & Berry, 2011) has measured property market outcomes in regeneration sites, finding that the returns on investment property in these areas have outperformed national benchmarks in the United Kingdom. However, this type of research cannot address the question how much investment would have occurred in the absence of these initiatives (also see Bourassa, 2006). This challenge has been addressed in the empirical literature outlined in section 5 on the impact of TIF designations, but, unfortunately, this literature focuses mainly on the impact of TIF's on property values, either within district boundaries or at the city level. The only exception is Lester's (2014) assessment of the effectiveness of the Chicago's TIF programme, which employs propensity score matching to analyze the ability of TIF's to catalyze commercial and residential property investment.

Over the years a sizeable literature has emerged that investigates the impact of planning and land use regulations on the housing market, but the effects of planning restrictions on the commercial property market have been relatively little researched. Several studies have recently begun to explore the relationship between the planning system and the retail and office sectors (see Jackson & Watkins, 2005, 2007; Cheshire & Hilber, 2008; Cheshire, Hilber, & Kaplanis, 2014), but comparable work on the industrial sector is still largely absent. One attempt has been made by Henneberry, McGough, and Mouzakis (2005) who examine the economic impact of planning regulations on the office and retail sectors, but also consider their effects on the industrial property market. Thus, very little is known about the impact of land use regulations on the performance of the industrial property market. This is rather disappointing as the effects of supply restrictions might be especially large for the industrial sector, because manufacturing industries and warehousing activities tend to use more space than office or retail users (Nathan & Overman, 2011).

This thesis takes a particular interest in exploring whether the supply of greenfield land affects investment activity in existing industrial areas. The linkage between the supply of greenfield land and the decay of existing urban areas has also been recognized by commentators in other countries (see e.g. Brueckner, 2000; Barker, 2003, 2006). As in the Netherlands, these relationships have been assumed, rather than explored empirically. As a result, very little is known about the effects of supply restrictions on the spatial pattern of property investment. The work of Nelson and colleagues (Dawkins & Nelson, 2003; Nelson et al., 2004) provides a rare example in this direction by examining how restrictions on greenfield development incorporated in growth management programmes affect the level of development activity taking place in central cities. The only study that explores the nature of this relationship *within* the city is undertaken by Adams and Leishman (2009), although their research focuses on development viability as opposed to actual development activity.

1.7 OUTLINE OF THE THESIS

The four questions guiding this research are dealt with throughout the different chapters of this thesis. Most chapters are associated with particular research questions, as can be seen from Table 1.7. The first question is addressed in chapters 2 and 3. Chapter 2 investigates how municipalities assess market conditions, and the way these analyses influence decisions to make more serviced building land available. Chapter 3 explores the way in which municipalities determine asking prices of the building plots they offer for sale by integrating insights generated from qualitative research in an econometric model of land values. In chapter 4, the second research question is addressed. It presents results from a model that predicts the probability of a site being targeted by regeneration to examine the role that economic distress plays in the decision to designate regeneration areas. The third research question is dealt with in chapter 5. Building permit data are utilized to estimate the impact of the planned provision for new industrial development on investment undertaken by firms at industrial sites. The analysis distinguishes between investment in new built structures and refurbishment of existing structures. The fourth and last research question is addressed in chapters 5 and 6. The effectiveness of regeneration initiatives is evaluated, looking at outcome measures that are related to the most commonly articulated policy goals. Finally, chapter 7 draws together the evidence and responds to the research questions.

Table 1.7

Research questions and corresponding chapters

RESEARCH QUESTION	CHAPTER	TITLE	OUTLET
1. How do municipalities determine the overall quantity and price of land to be made available for industrial development?	2	Understanding industrial land supply	Journal of Property Research
	3	Determinants of industrial land prices	Journal of European Real Estate Research
2. Are physical regeneration initiatives being delivered in appropriate areas?	4	Countering decline of industrial sites	Urban Studies
3. What is the impact of the planned provision for new industrial development on both new construction and refurbishment activity?	5	Planning intervention and business development	Submitted to a peer reviewed journal
4. Are physical regeneration initiatives having the desired effects?			
4. Are physical regeneration initiatives having the desired effects?	6	Evaluating urban regeneration	Urban Studies

2

UNDERSTANDING INDUSTRIAL LAND SUPPLY



Abstract

The supply side of real estate markets has remained relatively neglected compared to the body of work that studies the demand side. Consequently, little is known about the way that suppliers actually make decisions about the quantity of land and property to be made available for sale at any one time. This paper investigates how one particular type of suppliers, public developers of serviced industrial building land in the Netherlands, assess market conditions, and the way these analyses influence decisions to make more serviced building land available. This paper presents evidence from interviews amongst municipal developers and finds that profit considerations are not the main motive behind their decisions to develop industrial land. Municipalities are involved in land development primarily because they want to be able to steer local economic development. Furthermore, they also pay attention to 'nonprice' signals of market conditions – sales levels in particular – when deciding to make more land available for sale. However, we should be cautious with interpreting these results since this study only addresses public agencies, which might operate with 'soft budget constraints' and might have alternative preference functions than commercial developers.

Ploegmakers, H., Van der Krabben, E., & Buitelaar, E. (2012). Understanding industrial land supply: How Dutch municipalities make decisions about supplying serviced building land. Journal of Property Research, 30(4), 324–344.

2.1 INTRODUCTION

Despite their important influence on land and property development, developers and developer strategies have received limited attention in real estate literature (DiPasquale, 1999; Mayer & Somerville, 2000a; Nanthakumaran, Watkins, & Orr, 2000; Henneberry & Rowley, 2002; Green, Malpezzi, & Mayo, 2005; Ball, Meen, & Nygaard, 2010). When the behaviour of developers is addressed, the majority of studies is carried out within the tradition of mainstream economics. Most past research aligned with this framework has made use of econometric analysis and has concentrated on the national or regional level, although several studies have recently moved to the local scale with a particular emphasis on the impact of planning regulations (see Mayer & Somerville, 2000a; Green et al., 2005; Quigley & Raphael, 2005; Ball et al., 2010). These analyses are predicated on the notion that developers maximise profits and

development activity is modelled as a function of changes in property prices and construction costs.

This kind of research has been criticised for its inability to capture the ‘humanness’ of human behaviour (Henneberry & Rowley, 2002, p. 99; also see Coiacetto, 2001). In addition, the econometric literature itself leaves some ambiguous results in relation to the textbook descriptions of developer behaviour. DiPasquale (1999) who has reviewed econometric studies on the determinants of housing supply observes that developers also pay attention to ‘nonprice’ signals of market conditions in deciding whether to construct new buildings (also see Mayer & Somerville, 2000b; Ball et al., 2010). According to DiPasquale (1999), these consistent ‘anomalies’ in econometric studies suggest that a full understanding of how suppliers actually make decisions and view the market is absent. Assuming that these issues are not easily resolved by even the most sophisticated econometric analysis of aggregate time-series data at the national or metropolitan level, she calls for empirical inquiry at the micro level where the unit of observation is the developer.

Although costly to collect, the micro foundations of supply in principle could be examined by using quantitative firm-level data, as Ball et al. (2010) have recently demonstrated. While it is certainly important to bring such findings to bear on investment decision-making in real estate markets, this paper finds merit in a more direct way to observe actual decision-making. In order to provide an understanding of the investment decision processes and the information flows relevant to development activity, both structured and semi-structured interviews were conducted with developers. This is congruent with the tradition of (old) behavioural economics that has an explicit focus on micro foundations (Cyert & March, 1963; Simon, 1987a). Within this tradition, interrogating decision-makers about expectation formation, and modes of calculation and reasoning is considered as an important empirical tool to understand the procedures that economic actors employ in decision-making (Simon, 1986, p. 211).

The aim of our paper is to increase the understanding of the decision-making processes of one particular type of supplier: public developers of serviced industrial building land in the Netherlands. More specifically, this paper investigates how public land developers (i.e. municipalities) assess (future) market conditions, and the way these analyses influence decisions to make more serviced building land available. Compared to property developers even less is known about how developers of serviced building land behave – be they public or private. This should not come as a surprise as in most real estate markets, land and property development are carried out by the same actor (but not in the Netherlands). This research employs a qualitative research

method by means of both structured and semi-structured interviews amongst municipal developers. In section 2, we will describe the context of industrial land development by municipalities. Section 3 addresses behavioural and institutional approaches to developer decision-making. Section 4 presents the results from the interviews before drawing together the conclusions of the paper.

2.2 THE PROCESS OF INDUSTRIAL LAND DEVELOPMENT IN THE NETHERLANDS

The focus of this paper is on the new net additions to the supply of serviced building land¹⁷ for industrial uses, which is determined by the production decisions of land developers. Serviced building land is land already designated for industrial development on which industrial building construction can start instantly. It concerns land on ‘formal’ industrial estates: sites that the local land use plan (*bestemmingsplan*) designates as being suitable for activities in manufacturing, logistics and services sectors. Sites that are designated exclusively for offices are not covered. Since land for industrial uses may also be acquired on locations outside industrial estates, this study does not cover the total supply in the industrial land market. However, we assume that industrial land transactions – the sale of building plots on which construction still has to take place – occur only on designated industrial estates, because land transactions for industry in other urban areas concern mainly second-hand industrial properties.

In the Netherlands, development often takes place in two related but distinct stages, each within its own market: land development and property development. Land is often exchanged twice before construction takes place. First, the initial owner (supplier) sells (agricultural) land to a land developer (demander). In the ‘secondary’ market of serviced building plots (Halleux, 2008, p. 260; Van der Krabben & Buitelaar, 2011), the land developers become the suppliers, while the demanders of land are commercial property developers or

17 Serviced building land is also referred to as subdivided or assembled land. Mohamed (2010, p. 431) defines subdivided land as the product that results when undeveloped land (parcels) is bought, improved with infrastructure and other features in accordance with local government permits and approvals, and divided into developed land (lots) that satisfies the conditions under which a building permit to construct houses will be granted. According to Colwell and Munneke (1999) land assembly typically occurs in urban areas where redevelopment is taking place and it involves the removal of physical capital such as streets, pipes and wires. For the remainder of this paper, the term serviced building land will be employed for land transferred from rural uses and land redeveloped from one urban land use to another (Needham, 1992).

final users. In most real estate markets, the firm that constructs the buildings will usually also acquire and service the land, but there are several known examples of other countries with an active 'secondary' market of building plots. In the US residential market, land development is often carried out by subdividers, whose aim is not to construct and sell houses but to develop and subdivide building plots and to sell these to homebuilders or households (Goldberg & Ulinder, 1976; Mohamed, 2010).¹⁸ Specialist land developers are also active in France (Motte, 1992; Verhage, 2002). These so-called *aménageur-lotisseurs* can be either public, quasi-public or private organisations, with quasi-public land developers being the most important in industrial land development (Motte, 1992). A similar division of labour has emerged in Flanders (Belgium) (Halleux, 2008). In the Dutch industrial land market, building plots are usually directly sold to the final user (firms in services, manufacturing and logistics sectors), who subsequently commissions the construction of new industrial property. Virtually no exchanges take place between property developers and final users (or investors). The supply of new speculatively built industrial properties is, therefore, very small (Needham & Kruijt, 1992; Louw, 2000).

Since the Second World War, municipalities have pursued an 'active land policy' with respect to industrial land. And they continue to do so, in contrast to housing development, where an active municipal land policy has come under pressure in the last decade or so (Buitelaar, 2010). On industrial estates, approximately 73% of all available building plots are owned and supplied as serviced land by municipalities, while private investors and semi-public regional development companies own respectively 13 and 14% (Segeren et al., 2005; Van der Krabben & Buitelaar, 2011). An active land strategy implies that municipalities acquire (agricultural) land, service it, provide the necessary infrastructure and reparcel it into building plots, before it is sold off to interested parties (Needham, 1997).

This strategy has been institutionalised through municipal land development departments. Municipalities bear the corresponding risks and reap any profits. Since Dutch municipalities are allowed to raise only a small part of their income themselves through local taxation (a grant from the national government – *gemeentefonds* – constitutes the bulk of their income), revenues from land development provide an important additional source of income to the municipality. Furthermore, profits transferred from the land development department to the general resources are one of the few sources of income that

18 We are not aware of formal accounts of subdivision activity in the context of industrial land development in the USA. Nonetheless, serviced building land for industrial uses is sold on a regular basis before building construction takes place as is evident from the number of studies that examine transaction prices of vacant building land (see e.g. Kowalski & Paraskevopoulos, 1991; Sirmans & Slade, 2012).

are not earmarked and on which the municipality itself can decide (Needham, 2007, p. 186). Land development can thus be considered a means of improving the financial independence of municipalities. Korthals Altes (2008) shows that on average (before the global economic and financial crisis) municipalities have accumulated substantial profits by developing building land. In 2005, for instance, 12% of current local government income came from land development revenues (Korthals Altes, 2008). However, it is likely that most revenues were received from the sale of land designated for other than industrial uses, such as housing, retail, office and mixed-use development as those types of land development generally appear to be more profitable.

From the beginning of the 1990s, higher governmental tiers have become more involved in the planning process of new industrial estates. Their key objective is to secure sufficient releases of industrial land as to accommodate future economic growth. Provinces are supposed to compare demand forecasts with each region's existing stock of available building land and the supply pipeline. In the case that demand exceeds supply, provinces have to specify in their structure plans the location of new industrial estates. Municipalities are supposed to translate these expansions into their land use plans (Louw, 2000). Nonetheless, municipalities enjoy considerable political autonomy in the context of their decisions to develop new schemes as planning constraints are hardly imposed by higher governments (i.e. provinces). In general, provinces allocate a generous amount of land for industrial use (Olden, 2007; Van Dinteren, Posthuma, & Bruin, 2007; Court of Audit, 2008; Louw, Needham, Olden, & Pen, 2009; Olden, 2010). According to Olden (2010), the sum of all provincial predictions is 13–27% higher than the national forecast.

Public governments have been involved in industrial property markets in other countries as well, with the UK as one of the most notable (and best documented) examples. Since the 1930s, governmental bodies in the UK have been promoting regional development in depressed, predominantly peripheral areas through the public provision of industrial buildings (Wood & Williams, 1992; Jones, 2005). Buildings in the public stock were usually let to the final users, but premises were also sold to them and sometimes, when there was some demand, serviced building land was sold to commercial developers. At the end of the 1980s, it was decided to privatise the portfolio of publicly held industrial property (Jones, 2005). The underlying assumption driving this operation was that the sale would result in higher rents and therefore stimulate investment by the private sector. The general opinion was that rents were low, partly because public agencies offered rental units below prices that the industrial firms would be willing to pay and partly because the high vacancy levels, accepted by governments, had a depressing effect on rents (Fothergill, Monk, & Perry, 1987; Jones, 2005).

Although surely advantageous to the final users, the low rents were assumed to be detrimental to the viability of private investment schemes. In other words, private sector investment was crowded out by the public interventions. A comparable policy narrative has recently emerged in the Netherlands. This narrative suggests that land prices have to be raised and the availability of serviced building land restricted for private development and investment to occur (THB, 2008; BWU, 2009).

For the Scottish industrial property market, Jones (2005) argues that these assumptions did not prove to be correct in that he found no evidence of considerable increases in either rents, speculative development or institutional investment after the privatisation. In addition, Segeren et al. (2005) have previously observed that in most regions of the Netherlands the average asking prices of serviced building land offered by private developers are even below the prices charged by municipalities.¹⁹ Jones (2005) also contends that governmental organisations still intervene directly in the industrial property market, albeit in a different guise. As in many other countries they are sometimes actively involved in urban regeneration by providing serviced building land and buildings. However, the focus of this paper is primarily on municipal decision-making processes in the context of greenfield development.

Industrial land development has not been without problems for the municipalities. At the end of the 1970s and the early 1980s, several municipalities had acquired large areas of land to be developed for industrial uses. But then the market turned: the amount of new industrial land that was sold or leased to firms declined sharply to a record low of 231 hectares in 1982.²⁰ In 1985, it was estimated that the area of industrial land held in stock by municipalities had a value of 2.3 billion Euros. The annual interest costs on this stock of land were substantial, ranging between 90 and 180 million Euros (Lulofs, 1987). Some of the municipalities would have gone bankrupt under the interest charges (Kruijt, Needham, & Spit, 1990; Needham, 2007). That is, if municipalities could have gone bankrupt! Several municipalities received external finance from the national government for these severe cost overruns (see e.g. Kortenoever, 1989). It can be argued that municipalities had their budget constraints 'softened' in this way. Following Kornai (1986), a budget

19 It should be noted that they did not control for other potential influences on land prices such as the quality of the servicing. While controlling for characteristics that are assumed to have an impact on prices, Saz-Salazar and García-Menéndez (2005) find that in the Spanish region of Valencia the price of industrial building land provided by public developers is significantly below the price of land provided by private developers.

20 Between 1976 and 2008, in total, all over the country, on average 878 hectares of industrial land per annum were sold or leased to companies (Olden, 2010).

constraint becomes soft²¹ when the tight relationship between expenditure and earnings is loosened, because excess expenditure will be covered by another institution. A further condition is that the decision-maker expects (with strong probability) that he will receive external financial assistance in case of financial difficulties.

Due to these problems, industrial land development became subject to considerable academic and political scrutiny (Needham & Louw, 2006). Several studies were conducted on the effectiveness of the methods used to forecast demand for industrial land. These investigations centred on the 'land coefficient method' – first put forward by Bak (1961) – which assumes that the area of land that a firm demands is proportional to the number in employment. Only a few forecasts proved to be correct and the efficacy of the land coefficient method was questioned (Van Aalst, Mustert, & Reimerink, 1985). Several years later concerns about the land coefficient method re-emerged. Interestingly, this time it was suggested that shortfalls of industrial land would appear in the near future, partly due to the forecasting errors associated with the method (see e.g. EZ, 1994). The national government subsequently requested the Netherlands Bureau for Policy Analysis (CPB) to refine the land coefficient model. This modified method, called the 'Business Location Monitor' is currently still employed, not only to inform decision-making at the national level, but also to provide provincial planning authorities with regional forecasts of the demand for industrial land (see Needham and Louw (2006, p. 83) and Schuur (1999) for a description of the model).

While the regional and national forecasts generated by the land coefficient method have been subject to considerable scrutiny,²² sparse attention has been directed towards the forecasting methods actually used by municipalities. This is surprising since the majority of new additions to the existing stock in the Dutch industrial land market are the result of the investment decision-making processes by these actors. In general, little is known about the way that municipalities actually come to the decision to make more serviced building land available.

21 Soft budget constraints were a key characteristic of socialist economies, but soft budget constraints are also extant in market economies. They mostly involve a government, through the bailout of enterprises and banks (public and private) or of lower-level governments. The trend towards a soft budget constraint has been observed in real estate literature, especially in (social) housing markets (MacLennan & More, 1997; Nessler, 2003).

22 Since the 1990s improvement several of the assumptions underlying the model are still being criticised (see e.g. Needham & Louw, 2006; Knoben & Traa, 2008; Louw et al., 2009).

2.3 BEHAVIOURAL ECONOMICS AND DEVELOPER DECISIONS

Behavioural economics that seeks to enrich economic analysis with more realistic psychological underpinnings is attracting increasing attention (Sent, 2004; DellaVigna, 2009). This approach has also made its way into the field of real estate research. Recently, reference has even been made to a nascent ‘behavioural turn’ in housing economics (Watkins & McMaster, 2011). Examples of ‘behavioural’ contributions include studies of decision-making processes by property valuers (Levy & Frethey-Bentham, 2010; Scott & Lizieri, 2012; and see Diaz & Hansz, 2007 for a review) and investors (Gallimore, Hansz, & Gray, 2000; Roberts & Henneberry, 2007; Jackson & Watkins, 2011). There are, however, different approaches within the tradition of behavioural economics. In this respect, Sent (2004) distinguishes between ‘old’ and ‘new’ behavioural economics. The main difference is in the treatment of rationality. New behavioural economics, which can be traced back to the work of Tversky and Kahneman (1974), starts from the assumption of expected utility maximisation that has characterised mainstream economics and then explores systematic biases and departures (anomalies) from the standard assumptions (see Camerer & Loewenstein, 2004).

In contrast, old behavioural economics, which relies heavily on the contributions of Herbert Simon, seeks to develop an alternative account of human behaviour. A central tenet in the work of Simon is the concept of ‘bounded rationality’ (1987b), which refers to cognitive limitations that prevent real world decision-makers from behaving in ways that approximate mainstream economic theory. Therefore, according to Simon, the outcomes of decisions cannot be predicted without knowledge of the processes that have generated them. In this regard, Simon (1976) distinguishes between substantive and, following psychologists, procedural rationality. Whereas the substantive rationality, embraced by mainstream economics, is concerned with the quality of decision-making outcomes (decisions that are objectively best in terms of given goals, e.g. utility or profit maximisation), procedural rationality depends on the process that has generated it. For Simon, a move from theories of substantive to procedural rationality requires a shift from emphasis on deductive reasoning to an emphasis on a detailed empirical examination of decision-making procedures employed by business firms, governmental organisations and other economic actors, regarding capital expenditure decisions for example (Simon, 1976, 1986).

A similar line of reasoning can be found in the more recent work by Hodgson, who attempts to renew the old institutionalism of Veblen, Commons and others. In fact, Simon himself regarded the tradition of old institutional economics as the ‘principal forerunner’ of behavioural economics (1979, p.

499).²³ Like Simon, Hodgson (1997, p. 663) stresses that economists have typically ignored the procedures and rules that are employed by agents when deciding and acting in the real world. Recognising this with regard to theoretical explanations of market outcomes such as prices (1998, 2008), he then outlines an alternative framework that is predicated on a detailed investigation of the key processes that govern price formation in specific institutional contexts. Thereby, the approach examines the particular routines employed to calculate prices, to obtain and use information and to revise prices in line with the experience on the market (Hodgson, 1998, p. 170). While Hodgson primarily focuses on price formation, this framework can be extended to explain other market outcomes such as levels of new development.

It can be argued that both traditions imply a more inductive method to examine decision-making. In this regard, Simon advocated supplementing econometric modelling with additional methods of inquiry such as case studies and surveys (Simon, 1986, 1987a). Ferrari et al. (2011) have recently argued that a combination of both traditions, that they label 'Original Behavioural Economics', provides a potentially fruitful basis to explain the decision-making behaviour of the various economic agents involved in real estate markets. It should be noted, however, that old institutional economics deviates from behavioural economics in that it stresses that bounded rationality is an important but insufficient explanation for the origin and adoption of certain routines and habits. Instead of focusing on explanations that emanate from the behaviour of the single agent the importance of interactions with other agents is stressed (see Hodgson, 1997). Yet, as the aim of this paper is to explore the procedures and routines that are actually employed in decision-making processes, this falls outside the scope of this paper.

Several previous studies of developer behaviour have already drawn on insights from (old) behavioural economics and old institutional economics. Mohamed (2006), for instance, has used concepts from both 'old' and 'new' behavioural economics to explain why small residential developers satisfice (also see Mohamed, 2009). Guy, Henneberry, and Rowley (2002) have demonstrated the specific cultures and 'operational' rationalities that drive decisions of different types of developers. In addition, several institutional economics-based studies have illustrated the importance developers attach

23 Hodgson also notes that Simon's contributions have clear precedents in the work of old institutional economists. He refers to John Maurice Clark who wrote that 'a good hedonist would stop calculating when it seemed likely to involve more trouble than it was worth' (as cited in Hodgson, 1997, p. 668), which is obviously commensurable with Simon's concept of satisficing. Furthermore, he argues that the old institutionalist approach to explain prices outlined below has close affinity with the behavioural theory of the firm by Cyert and March (1963).

to social networks, reputation and trust (Charney, 2003, 2007; Adams et al., 2012). Finally, although they did not explicitly adopt a behavioural economics orientation, so-called ‘behavioural’ studies have previously shed light on various aspects of developer decision-making such as location decisions (see e.g. Goldberg, 1974; Goldberg & Ulinder, 1976).

However, these studies focus on decision-making by private firms rather than governmental organisations, and they do not explicitly address the way developers actually decide about the quantity to be made available for sale at any point in time. An exception to the latter is the ‘behaviouralist’ modelling approach by Henneberry and Rowley (2002) in which specific decision-making patterns identified in qualitative research serve as input for a quantitative model of developer investment decision-making. In addition, based on interrogations of house builders active in the UK, Adams, Leishman, and Moore (2009) find that increased demand appears to result in higher prices rather than increased construction rates, while decreased demand is addressed through incentives and increased marketing, rather than by ceasing construction. The normal response of UK house builders to market changes is thus to ‘use the price mechanism to manage demand’ (Adams et al., 2009, p. 312).²⁴ To the authors the abandonments of development schemes observed during the latest recession demonstrate the severity of this crisis for the house building sector.

Public land development is initiated in anticipation of demand for ‘ready-to-built’ building plots, either by end-users, investors or developers. Consequently, municipal land developers have to form expectations about future demand for serviced industrial building land. This paper seeks to address, in that context, two research questions. Firstly, which methods are employed by municipalities to forecast demand for industrial building land and which are the most frequently used? Consideration will be given to what sources of information are used to form expectations and whether and when forecasting enters into the decision-making process. Secondly, we investigate how municipalities determine the development value of a scheme and to what extent this appraisal influences the decision to develop.

Industrial land development involves several important investment decisions: acquiring the land, making a land use plan and preparing the site for construction, which includes arranging the servicing (roads, sewers, power, etc.). In the empirical research, the focus is on the decisions to initiate a new

24 Adams et al. (2009) then proceed to explain this specific behaviour in relation to the particular institutional structure of housing provision in the UK. House builders limit the number of new houses for sale at any one time, in order to achieve the high revenues necessary to recover the costs for land acquisition. The costs of raw building land are great because planning restrictions on land release encourage developers to offer the highest prices so to make winning bids for sites.

development plan and to start new development. Land purchase decisions are not considered, because municipalities often acquire agricultural land well before actual development is commenced, sometimes even before the land is allocated for industrial use (a land use plan is not a necessary prerequisite for land acquisition). One of the reasons for this behaviour is the common practice of land banking. Most municipalities keep a stock of raw building land to be able to respond rapidly to unexpected fluctuations in demand. It can, however, be advantageous to create a land use plan before the phase of land acquisition is started, because municipalities can make use of their compulsory purchase powers in this situation. On the other hand, they also risk paying a higher price, because the owners may withhold land due to expected price increases in the future.

2.4 THE RESULTS OF INTERVIEWS WITH MUNICIPALITIES SUPPLYING INDUSTRIAL LAND

2.4.1 RESEARCH METHOD

The empirical data that are used to answer the research questions were assembled in the second half of 2008 by the Netherlands Environmental Assessment Agency (PBL, 2009a). The aim was to understand better how municipalities decide to develop industrial land and to redevelop older industrial estates. Municipal officers were asked to report the motives for industrial land development and the (formal) forecasting strategies used at the moment it was decided to make more land available. The research concentrated on municipalities in which a minimum of 100 hectares of land on dedicated industrial estates had been provided up to 2007, as listed in the national database of industrial estates (IBIS). This was the case for 150 municipalities.²⁵ These account for the vast majority of industrial land provision; 75% of all industrial land in the Netherlands had been provided within their boundaries, according to IBIS. Because the selection was not based on the size of the municipality, but on the amount of land it had provided on industrial estates, small municipalities with a large supply of industrial land are also included in the sample.²⁶

25 In 2007 there were 443 municipalities. In comparison to 2006, 25 municipalities were abolished and 4 new ones created. Since January 1st, 2012 there are 415 municipalities (Statistics Netherlands, 2012, October).

26 Not all land on these industrial estates was actually supplied by municipalities, since private land developers are also active.

Semi-structured interviews were conducted with 24 municipalities within the sample. The municipalities were selected as follows: 12 of the 75 largest municipalities in the sample and 12 of the 75 smaller ones. Within each group, there was equal representation in the Randstad area, the peripheral regions, and the area in between. Together, these municipalities had provided 16% of the national area of industrial land in 2007. Market conditions differ between these localities, and in some localities there are shortages, in others an excess supply. Additionally, to obtain a representative data-set across the Netherlands, the remaining 126 municipalities were asked to complete a standard structured questionnaire, during a telephone interview. Telephone interviews were used in order to enlarge the response rate and to reduce interpretation problems. All the respondents to the questionnaire and to the interviews were working on policy for industrial estates in the department of economic affairs or of land development (depending on the internal organisation) within their respective municipalities. Some 64 municipalities responded to the questionnaire; this was a 51% response rate. This survey can be regarded as providing a representative illustration of industrial land development by municipalities, although the larger municipalities in peripheral areas and the smaller municipalities in the Randstad are slightly underrepresented (see Table 2.1). However, there are virtually no small municipalities with a large stock of building plots in the Randstad that were not surveyed.

Table 2.1
Response rate for telephone interviews

	RANDSTAD AREA			INTERMEDIATE REGIONS			PERIPHERAL REGIONS		
	Sample	Response	%	Sample	Response	%	Sample	Response	%
Large municipalities	20	12	60	24	12	50	21	8	38
Small municipalities	4	1	25	21	12	57	36	19	53
Total	24	13	54	45	24	53	57	27	47

Source: PBL (2009).

2.4.2 METHODS USED TO FORECAST DEMAND

Only six municipalities used formal forecasting strategies to form expectations at the time it was decided to make more industrial land available. In this respect, none of the municipal interviewees used the land coefficient method. This should not come as a surprise since the land coefficient method is useful for generating *long-term* forecasts as economic cycles, which cause demand to fluctuate over time, are ignored (see e.g. Knobben & Traa, 2008). Even for this purpose the land coefficient method was hardly employed: three municipalities used models similar to the land coefficient method. The majority of municipalities that were interviewed indicate that their decisions to make more land available are informed by extrapolating previous sales rates onwards.

Another procedure to forecast demand that is mentioned uses inputs from firm consultations. Local economic affairs liaisons officers structurally monitor whether there are firms that want to move or expand in the near future. In some cases, this information is accompanied by waiting lists. A related method uses results from (local) firm surveys. Only one respondent did refer to the use of surveys. Municipalities thus seem to prefer more structural and less formal consultations of firms. This finding is consistent with previous work that has outlined the importance developers attach to maintaining personal contacts with other actors active in real estate markets (Charney, 2003, 2007; Adams et al., 2012). However, these studies have not explicitly addressed this issue in the context of expectation forming about future demand. Nonetheless, the number of municipal respondents that rely on informal contacts is relatively small compared to those that extrapolate recent sales rates. Finally, two interviewees said that decisions to develop new land were informed by the *long-term* forecasts only.

The questionnaire results reveal that only one out of three municipalities make use of formal forecasting techniques when they decide to make more land available. More than half of the municipalities commence new development on the basis of their *long-term* forecasts of demand. In this respect, the questionnaire revealed that more than half of the municipalities did not make *long-term* forecasts of demand for building land themselves. Instead they relied on existing predictions made at a higher scale. Those predictions could come not only from the provinces, for adjacent municipalities might decide to cooperate in order to coordinate planning of industrial estates.²⁷

27 Co-operation between neighbouring municipalities is facilitated by a special law, the 'Joint provisions act' ('*Wet gemeenschappelijke regelingen*' - Wgr). Some municipalities that were interviewed cooperate voluntarily under the regime of the Wgr, while others are obliged to cooperate by this law (municipalities in so-called plus-regions), for example by making a regional structure plan that sets out the desired future development of the region (Needham, 2007).

The fact that both the interview and the questionnaire results show that the majority of municipalities does not make use of formal forecasting strategies when they decide to make more land available can be related to their aim to always have a reserve of serviced building land. This is referred to as an 'iron reserve': a buffer of already serviced building land. The underlying aim is to prevent shortages in the face of unexpected changes in sales rates. In fact, new additions to the stock of building land have to keep up with the amount of land that is sold or leased to interested parties: one hectare sold, one new hectare supplied. Indeed, between 1991 and 2007, the total amount of 16,750 hectares of building land that was made available, was almost equivalent to the amount of land that was sold or leased to interested parties, namely 16,600 hectares (Olden, 2010).

The interview evidence shows that decisions to make land available are based on the principle that the amount of land has to be sufficient to secure a steady supply of serviced building plots. In this regard, one of the respondents said that the amount of land held in stock should be about 40–50 hectares, taking into account an average annual sales rate of 7–9 hectares. Another said that the 'iron reserve' should be equivalent to four times the average sales rate. According to the literature, as a rule of thumb, the available stock of serviced land should be equivalent to two to five times the average amount of building plots sold per year (Netherlands Bureau for Economic Policy Analysis, 1999; Van Dinteren et al., 2007; Olden, 2010). One municipal interviewee explicitly stated that long-term demand projections are not made, because new development is adjusted to the current disposal levels. Another interviewee pointed out that the ambition of the municipality to maintain an 'iron reserve' had been thwarted because of constraints on industrial land supply within the municipal boundaries and long planning procedures.

Municipalities were also asked whether they adjusted their expectations of demand to the available supply of vacant land on existing (older) industrial estates. Since 2008, municipalities are obliged by the national government to make a better use of the existing stock of industrial land and property. This policy is based on a guideline put forward by the Social and Economic Council of the Netherlands (SER) and referred to as the '*SER-ladder*'. This guideline stresses that new demand for industrial space should, where possible, be accommodated by redeveloping vacant property or by intensification of land use on existing industrial estates. Only if both options are inappropriate, can the demand for space be accommodated by developing new industrial estates. The majority of interviewees assume that only a small part of demand for industrial space can be absorbed by the existing stock. Therefore, these estimates hardly affect their decisions to make more land available by developing new industrial estates.

There are some notable exceptions. One respondent indicates that the municipal objective of absorbing 25% of demand for land on existing sites has been largely achieved due to a restricted availability of land on new industrial estates. In another municipality almost half of all demand for space could be accommodated by stimulating the take-up of vacant and unused land on existing estates. It should be noted that the potential supply on existing industrial estates also includes vacant properties that have been put on the market, due to closures, relocations or otherwise. Nonetheless, those interviewed said that they take into consideration only the amount of vacant land on existing industrial estates in their estimates. Within the questionnaire, nearly all municipalities (58) claim that they monitor potential supply in the existing stock of land. However, only 16 municipalities indicate that this information actually influences their estimates of demand for new industrial building land.

Finally, Dutch municipalities are often portrayed as being highly responsive to the amount of land supplied by neighbouring municipalities. Municipalities think that if they do not have a ready supply of industrial land, firms will go to surrounding municipalities (Van Oort et al., 2007; De Vor, 2011). De Vor (2011) has found that a 1% higher average annual growth rate of the available industrial land in neighbouring municipalities leads to a 0.66% higher average growth rate in the land available in the municipality. Although the presence of spatial interaction has been proved, the author states that it is unclear to what extent this may be attributed to the interjurisdictional competition. During the interviews, only one municipality said explicitly that the development rate in competing municipalities is taken into account in the decision to start new development.

2.4.3 THE ROLE OF THE DEVELOPMENT APPRAISAL IN THE INVESTMENT DECISION PROCESS

The results of the semi-structured interviews indicate that, for the majority of the municipalities, profit considerations are not the key motives behind land development. Only one municipal officer admitted overtly that expected profits were the reason to start development of land designated for industrial use by the province in their structure plan. In addition, several interviewed municipalities referred to the returns on land development as windfall gains. Another financial argument to take up the task of land development that was sometimes mentioned by municipalities is that the revenues from selling building plots offer the opportunity for covering 'plan-related' costs (such as infrastructure costs) and for cross-subsidising non-marketable land uses. For instance, one municipal officer stated that revenues

from industrial land development were employed to cross-subsidise other public investments, including a town hall and a swimming pool. However, most municipalities appear to ensure that no profit or no loss is made. This does not mean that municipalities never bear losses on industrial land development. Two municipal representatives explicitly state that on some development schemes it is difficult to avoid making a loss as a result of inflated land prices and lengthy planning procedures.

The main motive behind land development appears to be a 'quest for control'. Municipalities want to ensure that there is always ample industrial land available to meet demand. Building plots have to be available 'on tap!' as Needham (1992, p. 684) has previously noted. Additionally, some of the respondents claim to have high ambitions for the quality and management of the area and that these ambitions require public involvement. This is in contrast with the common view that the quality and management on industrial estates that are owned by municipalities is of substandard condition (see e.g. Council for Housing, Spatial Planning and the Environment, 2006; THB, 2008). Another argument for control that was mentioned during the interviews is the desire to influence the type of firms that buy land on industrial estates. In one municipality, political incentives influenced the decision to develop a new industrial estate designated for transport firms: politicians wanted to build on previous successes in attracting transport related companies to the municipality.

It is generally assumed that in development appraisals, land prices are residually derived by subtracting the expected development costs from the predicted revenues from selling new buildings (Leishman, Jones, & Fraser, 2000; Henneberry & Rowley, 2002; Morley, 2002). In this regard, prices of existing comparable properties are considered as an important benchmark for pricing the new properties that are to be built on the land. The price of serviced building land can be obtained by subtracting only the building costs from the expected development revenues (deducting the servicing costs from this figure would give the value of raw building land) (Needham, 1992). However, during the interviews, only two of the municipalities said that they use the residual valuation technique to determine asking prices of serviced building land. Most municipal respondents use prevailing prices of similar building plots as a base estimate to determine land prices. These results are consistent with other studies that have examined price-setting in the Dutch industrial land market (see e.g. Delforterie, Okkema, & Bousema, 2010). Several interviewees indicate that these benchmarks are then compared to the total incurred costs, since the revenues have to be at least high enough to cover those costs. Two municipalities use only the expected costs to determine the selling prices. The questionnaire results

give a similar picture. Nearly three quarters (47) of the respondents in the questionnaire use the prevailing prices of similar building plots as benchmarks to determine land prices and only six municipalities refer to the use of the residual valuation method.

The majority of municipalities thus start the development appraisal by taking a view of the preferred asking prices of land on neighbouring industrial estates. Summed over the whole development, these provide the total development value of the land. Subtracting the total development costs and the desired profits would give the maximum value that a municipality would be willing to pay in order to acquire the land. It is this maximum site value estimate that is regarded in several studies as having the strongest influence on the decision to initiate new development (see Antwi & Henneberry, 1995; Leishman et al., 2000; Henneberry & Rowley, 2002; Adams et al., 2009). The influence on development activity can be described as follows: when expected sales prices of serviced building land are above average, maximum site values will be higher (provided that the development costs remain relatively stable) and municipalities more prone to bid for sites with asking prices that they would normally think not worthwhile purchasing. Subsequently, more development will be initiated.

However, it seems that municipalities do not employ appraisals for the purpose of calculating the maximum value, but in order to calculate the expected profit from undertaking development (the site is already owned and land values are treated as a known cost). Perhaps, this is due to the fact that municipalities often acquire agricultural land well before actual development occurs, which is the common practice of land banking. Another explanation might be related to the fact that, at least in the past, municipalities employed a different rule of thumb to determine purchase prices. A price was offered that was at least as high as the existing use value, plus a 'sweetener', or the price by compulsory purchase, whichever was higher. The latter tended to be around twice the existing use value (Needham, 1992, p. 679). This price was below the residual value. However, these practices have changed recently, since landowners (i.e. farmers) increasingly attempt to capture more of the surplus value, by raising their asking prices to the residual value of the land (see e.g. Segeren, 2007).

What follows from the above is that in the Netherlands, industrial property prices are probably a poor determinant of industrial land supply, because they are seldom used to estimate the development value of a site. Industrial land prices on the other hand may have a significant impact on the rate at which new land is added to the existing stock of industrial land. Because, at least intuitively, rising industrial land prices, will result in fewer projects with

a calculated loss and thus more development may be undertaken. However, since the beginning of the nineties average industrial land prices have risen at a constant rate, whereas the annual additions to the stock of industrial building land have been more sensitive to changing market conditions.

2.5 CONCLUDING REMARKS

The empirical analysis for this paper has addressed two questions relating to the way in which Dutch municipal land developers assess (future) market conditions and the way these analyses influence the decision to make more serviced building land available. The first question investigated whether municipal developers pay attention to 'nonprice' market signals when deciding to make more land available for sale. The results suggest that a range of procedures is employed by municipalities to estimate demand for industrial land. These procedures include forecasts based on expected local employment growth, stated preference surveys amongst firms, informal contacts with firms and estimates based on sales rates, or a combination of these procedures. Decisions to make more land available are mainly informed by extrapolation of both previous and current sales levels. The notion of the 'iron reserve' illustrates that forecasting procedures are not the only actions employed by economic actors to cope with uncertainty as these reserves act to buffer the effect of forecast errors, or at least make outcomes less dependent upon them (see Simon, 1976, pp. 143-144).

The second question investigated the extent profit considerations influence the decision to make more serviced building land available. The research evidence is not clear whether profit considerations drive municipal decisions to develop industrial land, but the key motive behind development appears to be a 'quest for control'; municipalities want to be able to steer local economic development. What is clear is that the pricing of serviced building land is different from the residual valuation (i.e. land values are a function of the expected benefits on the land minus the expected costs of developing the land). Municipalities estimate the likely selling prices by using the prevailing prices of building plots on similar industrial estates in surrounding municipalities as a benchmark. This emphasises the importance of the particular institutional setting, such as the routines governing price formation, in which prices are being formed (Hodgson, 1998). Nonetheless, Delforterie et al. (2010) conclude for the Eastern part of the Netherlands that residual values would not differ in a significant way from the prices that are actually charged. In current market conditions (downturn), residual land prices are even below the prevailing prices,

which nuances the common view that prices charged by municipalities are below those that firms would be willing to pay (the residual value). On the other hand, a study by Hendriks, Kuijl, and Uitzetter (2011) indicates that in the metropolitan region of Amsterdam the larger part of recently sold industrial building land has been sold at prices below the residual value of the land (also see Geuting & Hendriks, 2008).

The empirical investigation started from the assumption that cognitive limitations (i.e. Simon's concept of bounded rationality) provide a reason for human beings' reliance on routines, habits and rules. Old institutional economists have provided additional, more socially grounded explanations of the origins of such routines and habits. It can even be argued that mainstream economics explanations can account for the observed behaviour. For instance, municipalities might be operating with 'soft budget constraints'. As a result of the soft budget constraint, firms are less responsive to changes in prices, and their demand for inputs (e.g. raw building land) is unconstrained (Kornai, 1986). In addition, one could claim that municipalities are in fact maximising something other than profits, employment growth for example.²⁸

However, as noted above, this paper intended to examine the procedures and routines employed by municipalities in their decisions to make more industrial building land available and not how these routines have emerged and evolved. It is, nonetheless, worthwhile noting that the construct of an 'iron reserve', which has its origins in business economics, was introduced in the 1980s as a means to improve the efficacy of the municipal decision-making process about industrial land provision (Lulofs, 1987). In addition, one of the most frequently mentioned reasons why municipalities rather than residually deriving land prices, use prevailing prices of building plots on similar sites in the region as a benchmark is that the transferability of industrial properties is restricted, due to their specific design and specifications. As a consequence, estimating the exchange value of the property that is to be built is difficult, since directly comparable properties are almost absent. Furthermore, difficulties also arise when estimating the values of the other variables that enter the residual valuation (such as costs) and because the method is quite sensitive to small changes in some variables (also see Morley, 2002).

Due to the reliance on changes in sales levels, the expectations of municipalities seem to be conditioned by previous experience. It is for this reason that municipalities do not succeed in anticipating turning points in the market, since it takes several years to develop a site. During a downturn,

28 According to Hodgson (2003) this statement is, however, non-falsifiable. The assumption of utility maximisation is invulnerable to any empirical test because it is impossible to identify all possible things that actors might be maximising.

municipalities make more land available than they sell and, as a consequence, the stock of industrial land initially grows. This effect was most marked during the 1980s downturn. In three years time, the amount of land immediately available for sale increased with 28%. The opposite occurs at the beginning of a boom period as municipalities make fewer lands available than they actually sell. During the middle of the 1990s, the proportional decrease almost equalled the increase in the 1980s (Olden, 2010). In these periods, the municipal aim of having land available for sale at all times obviously comes under pressure. Thus, municipalities do not fully succeed in eliminating all volatility in the market for industrial building land. In other words, they cannot guarantee that land is always available for sale.

While such habit persistence has also been identified amongst private developers (see e.g. Henneberry & Rowley, 2002), it appears that municipalities in their aim to always have building plots ‘on tap’ bear greater financial risks (particularly in relation to the interest charges on their land holdings) than private developers, without returns compensating them for these risks. In fact, a dominant view is that municipalities even accept smaller revenues. In general, it can be argued that given the particular division of labour in the Dutch industrial land market, it is local governments that bear the risks associated with boom-bust phenomena. In contrast, builders and end-users only face risks related to the short-run changes in construction costs and in the case of the builder that property prices have fallen and/or that there is no or less demand for the property when it is completed. Furthermore, land for development is readily available to them in most periods and they can acquire the land at prices lower than the maximum that they would be willing to pay. On the other hand, as previously noted, for private developers that want to carry out both land development and building construction this situation is surely detrimental as the prices that they could charge are too low to compensate for the risks (see also Needham & Louw, 2006).

The results from this study will reflect the operational context of the respondents at the time of the interviews. The research was undertaken before the global economic and financial crisis. Evidence is absent whether, analogous to the 1980s down-turn, the stock of industrial land is currently growing. What is clear is that the economic crisis has already brought some of the larger Dutch cities into (deep) financial trouble, because of substantial financial losses on their land development activities (Berns, Celik, Michiels, & Schenk, 2010; Celik & Berns, 2011). This suggests that further research needs to be undertaken. First, a follow-up survey could be administered amongst municipalities. Results of the two data points can then be compared and trends identified to see whether municipalities have changed their behaviour. Secondly, the

observed patterns of decision-making and the magnitude of these effects can be tested by using quantitative methods. A case has previously been made for research that combines results from micro-orientated behavioural studies with econometric analysis (see Henneberry & Rowley, 2002; Leishman & Watkins, 2004; Boelhouwer, 2011). Finally, the way in which constructs, such as the 'iron reserve', emerge and evolve deserves further research attention.

According to Adams et al. (2005a, p. 51) the ironic impact of the observed tendency amongst developers to use habit persistence based procedures to cope with uncertainty is that they might actually increase volatility by continuing to bring forward new developments when a closer reading of market conditions would suggest that it is time to stop building. They argue that these indications of habit persistence in property development indicate a critical role for public policy in containing risk and uncertainty in land and property markets, considering the detrimental impact of substantial volatility in land markets. Likewise, Healey (1998, p. 219) posits that one of the functions of the regulation of market processes is to stabilise market conditions and reduce uncertainty. Adams and Tiesdell (2010, p. 197) conclude that there are likely to be developers in the current recession who are thankful for the planning delays that have prevented new development at the height of the last boom. However, the case of the Dutch industrial land market shows that the (development) decisions of public authorities seem to be influenced by habit persistence as well. Perhaps, this is the real irony.

3

DETERMINANTS OF INDUSTRIAL LAND PRICES



Abstract

The purpose of this paper is to demonstrate how the specification of hedonic pricing models can be improved by using insights generated from qualitative research. In doing so it seeks to address one of the main problems in the specification of hedonic models, namely, that theory yields little guidance in the selection of the characteristics that should be included on the right-hand side. Building on the behavioural tradition in real estate research, this paper introduces a research approach that integrates insights from qualitative analysis in an econometric model of land values. The empirical segment explores the way in which asking prices of building plots for industrial purposes are determined in the Netherlands. It draws from interviews with municipal land developers, who dominate supply in this market. The information secured during these interviews relates to the characteristics considered important and the kinds of information used in the valuation process. Based on these qualitative data an econometric model is developed and estimated. The estimation results confirm qualitative evidence that the typical developer considers only a limited number of features of the land in the valuation process and that the primary source of information in setting asking prices relates to the prices charged in neighbouring municipalities. This study represents a novel attempt to examine the determination of land and property values by merging qualitative and quantitative, econometric analyses.

Ploegmakers, H., & De Vor, F. (forthcoming). Determinants of industrial land prices in the Netherlands: A behavioural approach. Journal of European Real Estate Research.

3.1 INTRODUCTION

The last three decades have witnessed an enormous increase in the body of literature that applies hedonic pricing theory to the analysis of land and property values. The framework has mainly been used in the context of housing values (see Sirmans, Macpherson, and Zietz (2005) for a review), but it has also been applied to the study of values of commercial property, building land and farmland. Unfortunately, theory provides little guidance concerning the correct set of independent variables for the hedonic regression (Pace, 1993; Mason & Quigley, 1996; Malpezzi, 2003).

While Lancaster (1966) and Rosen (1974), who are often cited for providing the theoretical basis of the hedonic price method, have elegantly demonstrated that houses are valued for their utility bearing characteristics, they did not identify specifically what those characteristics are. In the absence of theoretical guidance, the selection of relevant characteristics is generally based on the empirical results of earlier hedonic studies and experimentation with different model specifications. Preferences are thus inferred from econometric data, rather than from direct empirical evidence about actors' utilities, expectations and decisions.

The latter kind of empirical information can be gathered by observing valuation processes directly and by interviewing economic actors about the way that value judgements are formed. Such studies can offer guidance for model specification by identifying which characteristics are perceived to be important in the purchase decision and what kind of information is actually used in the valuation process. While the assertion that hedonic analysis requires prior studies that depend on interrogations or observations of actors engaged in valuation is by no means novel (Alexander, 1975; MacLennan, 1977), surprisingly little empirical work has been carried out in this direction (see MacLennan, 2012, p. 18). This paper attempts to address this challenge by offering a research approach that builds on the behavioural tradition in real estate research. Specifically, it explores the way in which asking prices²⁹ of building plots for industrial and business development are determined. The starting point of our analysis is prior qualitative research that involved interviews with a large number of municipal land developers, who dominate supply in this market segment. We draw on the insights contained in these studies to derive an econometric model of land values. The estimation of the model allows for an independent verification of the main implications from the interviews. Since we make use of a database that covers all sites for industrial and business development in the Netherlands, the quantitative analysis also permits us to assess whether the reported findings are generalizable across municipalities that did not participate in the interviews.

Previous research into the determinants of land and property values is complemented in two ways. First, this paper demonstrates how the modelling of

29 Obviously, there will be differences between (initial) listing or asking prices and eventual sales prices. However, asking prices will significantly influence valuation judgments of potential buyers. Research in the behavioural real estate tradition has shown that reported asking prices provide a powerful anchor for the eventual transaction price, even when the asking price does not seem credible (Northcraft & Neale, 1987; Black & Diaz, 1996; Diaz, Zhao, & Black, 1999; Buccianeri & Minson, 2013). Results from qualitative research reported in Segeren et al. (2005) suggest that sellers and potential buyers of industrial land negotiate other incentives such as contract conditions rather than sales prices.

real estate markets, particularly hedonic pricing modelling, can be advanced by using insights generated from qualitative analyses to improve the specification of the econometric model. As such, it responds to recent calls to integrate insights from qualitative studies into conventional econometric modelling frameworks (see Watkins, 2008; Boelhouwer, 2011). Second, the paper seeks to contribute to a better understanding of the way that developers make predictions of the eventual price of the product they offer for sale, an area that has received only limited attention in the literature (Leishman et al., 2000; Gillen & Fisher, 2002; Adams et al., 2009). In particular, it highlights how the presence or absence of local competitors might influence the price determination process. Developers will normally operate under conditions that are better characterised by monopolistic competition than perfect competition (see Jones & Watkins, 2009; Whitehead, 2014) and the case in which nearly all land for development is supplied by public agencies is a clear example of this sort of local markets.

The paper is organised as follows. The next section reviews the behavioural literature relating to value formation in real estate markets. The overview seeks to highlight the way in which insights from this emerging body of work are (or are not) incorporated in econometric models of property values. The third section presents findings from prior qualitative research that addressed the way in which municipalities determine asking prices of building plots. These qualitative data have been used to specify an econometric model, which is introduced in section four. Section five describes the data upon which the model is estimated and the following section summarises the main results of the modelling work. The final section draws the findings together and concludes by discussing how the adopted research approach can assist in the refinement and improvement of existing models of market outcomes (e.g. prices and levels of new development).

3.2 BEHAVIOURAL ECONOMICS AND VALUE FORMATION IN REAL ESTATE MARKETS

A growing number of studies have sought to apply the methods and concepts from the traditions of behavioural economics and behavioural finance to the study of price formation in real estate markets (Diaz & Hansz, 2007; Watkins & McMaster, 2011; Scott & Lizieri, 2012).³⁰ In this emerging literature there is a distinction between studies that explore specific departures

30 Ideas developed in the tradition of behavioural economics have also been applied to fields other than valuation such as investor (Gallimore et al., 2000; Gallimore & Gray, 2002; Roberts & Henneberry, 2007; Jackson & Watkins, 2011; Henneberry & Mouzakis, 2014) and developer decision-making (Mohamed, 2006, 2009).

from standard economic theory, whilst not rejecting the mainstream approach, and those that examine whether standard models (normative or descriptive) ought to be replaced by alternative models because of their failure to account for observed behaviour (Roberts & Henneberry, 2007; Marsh & Gibb, 2011; Scott & Lizieri, 2012). This distinction is, however, not unique to the real estate discipline. In this context, Sent (2004) refers to a 'new' and 'old' behavioural economics. In fact, the majority of studies of valuation behaviour are inspired by the work of Tversky and Kahneman (1974) on heuristic short-cuts in decision making, which, together with their 1979 paper on prospect theory, provided the impetus for the new behavioural economics tradition (Camerer & Loewenstein, 2004; Sent, 2004). New behavioural economics starts from the mainstream approach based on expected utility maximization, equilibrium and efficiency and then explores systematic biases and departures (anomalies) from these assumptions. Assumptions about psychological limitations are then added to existing models to account for the observed anomalies (see Kahneman, 2003; Camerer & Loewenstein, 2004).

Although Tversky and Kahneman (1974) identified several potential sources of biases, the adjustment and anchoring heuristic has received the most attention in real estate research (reviewed in Diaz & Hansz, 2007; Levy & Frethey-Bentham, 2010). Adjustment and anchoring behaviour implies that valuers make estimates by starting from an initial value (judgements by other experts, prices of comparable sales, asking prices) that is adjusted as more information becomes available. These adjustments are likely to be insufficient because different starting points yield different estimates, which are biased toward the initial values. Related studies have expanded the list of psychological biases in valuation processes by exploring the impact of context effects, which occur when preferences between options depend on what other alternatives are offered (Simonsohn & Loewenstein, 2006; Levy & Frethey-Bentham, 2010) and loss aversion, which suggests that sellers of a house dislike realizing a nominal loss from the purchase price much more than they like realizing a gain of equivalent magnitude (Genesove & Mayer, 2001; Engelhardt, 2003; Paraschiv & Chenavaz, 2011).

The behavioural real estate literature has relied heavily on evidence generated by controlled experiments (Diaz & Hansz, 2007), but more recent research has begun to add a number of 'behavioural' variables to standard econometric models of housing values. The aim is to test for the presence of specific biases in the 'field', but also to improve the accuracy of standard models

(Genesove & Mayer, 2001; Simonsohn & Loewenstein, 2006; Einiö, Kaustia, & Puttonen, 2008; Bucchianeri & Minson, 2013). The use of behavioural aspects in econometric analysis is, however, not confined to this strand of behavioural research. Elsewhere in the property literature there have been attempts to incorporate attitudinal data in econometric models (see, for example, Coolen, Boelhouwer, & Van Driel, 2002; Jackson & Watkins, 2007; Coolen, 2008).

Old behavioural economics, which is often associated with the contributions of Herbert Simon, implies a more thorough rejection of the utility-maximizing rationality of mainstream economics. According to Simon, (cognitive) bounds on rationality prevent human decision-makers from behaving in ways that approximate predictions from mainstream economic theory (Simon, 1987a, p. 222). As a result, the outcomes of decisions cannot be predicted without knowledge of the processes that have generated them. For Simon, this required a shift from emphasis on deductive reasoning to an emphasis on detailed empirical examinations of the processes that economic actors employ in making decisions (Simon, 1959, 1976, 1986). Against this background, he advocated supplementing econometric modelling with alternative modes of inquiry such as case studies, experiments and surveys (Simon, 1986, 1987a).

A number of contributions to the real estate literature have employed research approaches consistent with the tradition of old behavioural economics, given their emphasis on documenting the actual processes whereby real estate values are formed. Munro and Lamont (1985) aim to provide a more direct test of the shape and content of consumers' utility functions for housing services. To do so, they interrogate owner-occupier households about the housing and neighbourhood attributes they consider either important or unimportant in the decision to purchase a particular house (and see Adair, Berry, & McGreal, 1996, who also consider the perceptions of valuers). Diaz (1990a) explicitly applies the ideas of Simon on human cognitive processes in problem solving to develop a model of the valuation behaviour of expert appraisers. This study employs an experimental design to observe the entire valuation process employed by these actors from start to finish. The experimental observations reveal that actual appraiser's behaviour deviates substantially from normative models (also see Diaz, Gallimore, & Levy, 2002; Diaz, Gallimore, & Levy, 2004). More recent work has moved outside the lab and relies instead on in-depth interviews with home buyers and market professionals to explore how and at what price houses are purchased (Smith, Munro, & Christie, 2006; Munro & Smith, 2008). Building on Michel Callon's notion of markets as socio-technical *agencements* these studies

document the diverse array of tools, procedures, algorithms, material devices and people involved in the translation of values into monetary amounts.³¹

Although their research is explicitly designed to offer an alternative to the econometric modelling approach, Smith et al. (2006) suggest that the findings of qualitative studies of price formation might also change the way in which markets are modelled. Munro and Lamont (1985) also argue that hedonic studies could be improved by using survey-based data about the characteristics that are considered relevant to the value of a house and information about perceived, rather than 'observed', neighbourhood boundaries (in the definition of submarkets). Despite such observations, few real estate studies have sought to apply insights generated from qualitative analysis within a quantitative modelling framework. Outside the real estate discipline, the work by Bromiley (1986) provides a rare example. This behavioural study uses insights derived from qualitative research to identify the variables that should be included in econometric models of capital investment in property, plant, and equipment. To this end, in-depth interviews were conducted with large-scale corporations to examine their planning and implementation processes related to capital investment.

The current paper extends this approach to the investigation of price formation in real estate markets. The application of econometric methods to the analysis of market outcomes is normally associated with the 'atomistic' ontology of mainstream – and new behavioural – economics that implies that individuals make decisions on the basis of a rational calculus that weighs benefits against costs (Watkins & McMaster, 2011). This ontological position enables probabilities to be assigned to particular decision outcomes so that individual choices can be predicted and generalized using statistical methods. We would argue, however, that the application of econometric methods is also consistent with the tradition of old behavioural economics. The contribution by Bromiley (1986), mentioned above, is clearly aligned with this tradition in that it explicitly applies the ideas of Simon to develop a model of capital expenditure. Indeed, Bromiley is specific about the link to old behavioural economics. In addition, Simon himself contended that direct inquiries into the decision making

31 The framework proposed by Callon seeks to extend the behavioural economics tradition associated with the work of Simon: the particular heuristics, rules of thumbs and calculative tools that enable agents to undertake certain types of action are not only instrumental in reaching some preconceived ends, but, simply by being used, they propose certain types of action or calculation (Callon & Muniesa, 2005, p. 1237). The approach therefore takes a different ontological position in the sense that it rejects an asymmetrical divide between things or humans or, in the context of valuation processes, valuating agents and valuated things or objects (Çalışkan & Callon, 2009, 2010).

processes employed by economic actors could supply important inputs to econometric models (Simon, 1986). The next section reports the primary findings of the qualitative analyses, which informed the specification and estimation of an econometric model of industrial land values in the Netherlands.

3.3 DETERMINATION OF ASKING PRICES - QUALITATIVE EVIDENCE

This research draws on empirical material contained in three different qualitative studies with municipal land developers in the Netherlands. One is a study conducted by the Netherlands Environmental Assessment Agency (PBL, 2009a), which included 24 face-to-face interviews with municipal respondents selected from a sample of 150 municipalities. The municipalities in this sample were largely responsible for industrial land development in the Netherlands: three quarters of the total amount of land allocated to industrial and business purposes had been taken up for development within their administrative boundaries. Respondents were selected purposively to ensure that there was equal representation across the Netherlands. A further 64 respondents were recruited from the remaining group of 126 municipalities to participate in telephone interviews. The two other studies include interviews with a smaller number of municipalities (18 in total) confined to local market areas in the eastern (Delforterie et al., 2010) and central parts of the Netherlands (Geuting, Hendriks, & Quarré, 2011). The approach underpinning these studies was not to ask municipalities what they considered important characteristics to the value of land as in Munro and Lamont (1985) and Adair et al. (1996), rather questions were designed to document the particular methods of calculation employed by municipalities in order to arrive at an asking price of building plots. Before proceeding with a discussion of the main results of these studies, we briefly describe the process by which land for industrial and business uses is released in the Netherlands (see Ploegmakers, Van der Krabben, and Buitelaar (2012) for a more detailed account of this process).

Since the Second World War, municipalities in the Netherlands have dominated the supply of land on sites allocated for industrial and business development. Industrial land clearly is important to manufacturing and associated industries, but activities like wholesale, repair and maintenance and ancillary office activity have property and locational requirements that are often quite similar to those of manufacturing industries and therefore also end up being located on industrial sites. In addition, local land use plans often permit office development and out-of-town retailers on land allocated for industrial

and business purposes. Municipalities pursue an 'active land policy' to facilitate the release of land allocated in land use plans. This active strategy implies that a municipality acquires land, divides it into building plots, services it with roads and other infrastructure, connects these services to local networks and offers the resulting building plots for sale (Needham, 1997). While this strategy has come under pressure in other market segments (Buitelaar, 2010), the majority of building plots for industrial and business uses are still offered for sale by municipalities. Municipalities, therefore, dominate the supply of industrial land within their administrative boundaries. Nevertheless, there is competition (albeit locationally imperfect) between municipalities, because potential buyers looking for land will consider switching to another locality if the difference in land prices is attractive (Needham, 1992).

The residual valuation is the technique most frequently used by municipalities to determine land prices in other development sectors (housing, office and retail development) (Needham, 1997; Segeren et al., 2005). In the residual valuation the expected building costs (but not the servicing costs) are deducted from the predicted development revenues to calculate the maximum price at which serviced building plots can be sold. Development revenues are established by estimating the likely selling price of the property once completed (see Needham, 1992). Municipalities would not normally use the residual method in the appraisal of industrial land given the difficulties associated with estimating development revenues. The unique building design and specifications required by many business activities makes it often unlikely that there will be sufficiently close 'comparable' transactions to provide a reliable estimate of the future revenues from selling the completed property.

Instead, the evidence from the interviews suggests that the comparative method is the preferred valuation approach amongst municipalities. This technique entails making a valuation by using evidence from prices for similar sites in similar locations (see Adair, Hutchison, Burgess, & Roulac, 2005b). Municipalities use available evidence from building plots offered for sale in neighbouring municipalities. As many as 47 participants (almost three quarters) in the PBL telephone survey reported that they employed the comparative method to determine land prices. Only six interviewees indicated that they used the residual valuation technique. The remainder applied the cost approach in the appraisal of industrial land in which the value of the land is equivalent to the cost associated with acquiring and developing the site. A similar picture arises from the information secured during the face-to-face interviews, with 17 municipalities adopting the comparative method. All, but three, of the municipalities that were interviewed for the other two studies used the comparative method. Two out of the three municipalities that adopted the

residual valuation method, indicated that they would subsequently cross check the resulting valuation against available comparable evidence.

The question then is whether municipalities pitch in above or below the benchmarks provided by the asking prices in neighbouring municipalities. The research by Delforterie et al. (2010) and Geuting et al. (2011) indicates that municipalities make adjustments to valuations for only a limited number of features of the land offered for sale. The first feature for which adjustments are made relates to the extent to which individual building plots are visible from the road (trunk road or motorways). This is motivated by the fact that building plots that are easily visible from the road will give firms the ability to advertise their presence to traffic passing on the road. Evidence from four case study areas reported in Segeren et al. (2005) indicates that these building plots may command premiums of up to 25%. A second feature concerns ease of access to the motorway network. Municipalities seem to recognize that locations in close proximity to the major road networks will not only provide promotional advantages, but also advantages in terms of access to both suppliers and potential clients. The third attribute considered by municipalities is the classification of the site. Industrial sites are sometimes designated for particular business uses and activities, such as warehousing and distribution, high technology industrial activities or heavy industries. Here, heavy industries refers to firms that fall in one of the two classes with the greatest environmental impact in terms of noise, odour, dust and major industrial hazards according to a list provided the Association of Dutch Municipalities (VNG, 2007).³² Sites developed for high technology firms are often referred to as ‘business parks’ (see Kooij, 2015). The latter type of sites will generally command the highest prices. The fourth feature for which valuations are adjusted relates to the location of the site relative to the nearest (regional) core city. The basic assumption is that these cities are more attractive to firms. Land prices consequently decrease as distance from these regional centres increases.

Asking prices will also depend on the extent of competition that municipalities face from each other. Drawing on interviews with municipalities and other market actors and data about land price movements, Segeren et al. (2005) suggest that municipalities have become more confident in the prices they think they can achieve for the land in areas where land supply and potential competition is restricted. In contrast, the prices charged by municipalities are generally lower and close to the amount needed to cover the costs of development in areas with a more than adequate supply of land and hence much

32 Municipalities use this classification to determine which business activities are permitted on industrial sites and in other areas so as to minimize nuisance-like impacts of one land use on another.

competition from other sites. The authors find that asking prices are even below the costs incurred to develop the land in the more rural and peripheral areas of the Netherlands, which are characterised by low demand.

3.4 MODEL SPECIFICATION

In this section an econometric model of industrial land values is presented. Insights from qualitative studies, which have been discussed in the previous section, were used to guide the specification of the econometric model. To develop an estimation strategy that closely resembles the practice of the comparative approach employed by municipalities, we introduce a model that uses price information from land offered for sale in the recent past at sites in neighboring municipalities to explain the price of land on a given industrial site. The presence of such functional dependencies between prices is referred to as spatial autocorrelation or spatial dependence. Ignoring spatial dependence in a hedonic specification will affect the statistical validity of the results, since its presence will lead to biased and inefficient estimates of the regression coefficients (Can & Megbolugbe, 1997). Formally, we introduce a spatiotemporal autoregressive term in the conventional hedonic specification (Can & Megbolugbe, 1997; Pace, Barry, Clapp, & Rodriguez, 1998). This specification accounts for the fact that land prices at any given point t in time will be influenced by the absolute prices of land offered for sale at sites in neighboring municipalities prior to time t .

Besides the choice of the characteristics that should be included on the right-hand side of the hedonic equation, there are two other issues in the specification of hedonic models for which theory is not much of a guide either (Malpezzi, 2003). The first issue relates to the definition and identification of submarkets. While there is an extensive literature on submarkets that shows that property markets are highly segmented spatially (for a review, see Watkins, 2001), there is no strong theoretical basis for the appropriate definition of submarkets. Several approaches have been developed in the literature to identify submarkets and one is the use of interviews to demarcate submarkets in accordance with the boundaries defined by market participants (see, for example, Munro & Lamont, 1985, who use evidence from a household survey). However, market segmentation was not an explicit concern in the interviews on which this paper is based and, therefore, we do not formally test for submarket existence. The second issue pertains to the choice of the functional form of the model. We adopt a semi-logarithmic functional form, so the estimated coefficients can be interpreted as approximately the percentage change in the

value given a unit change in one of the independent variables.³³ This yields the following equation:

$$\ln P_{ikt} = \alpha + \rho \sum_j w_{ij} \ln P_{j,t-1} + \beta S_{ikt} + \gamma L_{ikt} + \delta C_{kt} + \phi A_{kt} + Y_t + \epsilon_{ikt}$$

where $\ln P_{ikt}$ is the natural logarithm of the asking price for each site i in municipality k in year t , w_{ij} is a spatial weights matrix that specifies the extent of influence which land offered at site j at time $t - 1$ has on P_{ikt} and the spatial autoregressive coefficient ρ measures the level of spatial dependence between the prices asked for site i and site j . The features of the land for which municipalities make adjustments are represented by S_{ikt} a vector of site attributes including the type of site and its visibility from the road, L_{ikt} a vector of locational characteristics of the site including distance to the motorway network and core city, C_{kt} a measure of competition from other municipalities and A_{kt} the overall amount of land available in the local market area. We control for year fixed effects, Y_t , to account for the common practice among municipalities to annually raise land prices to allow for inflation and other market trends (at least, before the global economic and financial crisis). The error term, ϵ_{ikt} , is assumed to be normally distributed with constant variance, and independent across observations. Section 5 provides further details on the included variables and used data.

The model that we propose incorporates spatial as well as temporal dependencies between the present asking price P_{ikt} and the price of land offered for sale at nearby sites in the recent past. The definition of the weight matrix is of crucial importance because it not only determines in an *a priori* fashion which sites are considered neighbours in both time and space to site i , but also the nature and extent of their influence on the price of the land offered for sale at site i . A number of alternative specifications can be used to define the spatial weights matrix. Based on the interview evidence, we construct a first-order contiguity matrix, such that $w_{ij} = 1$ if site j is located in a municipality that shares a common border or node with municipality k in which site i is located, and $w_{ij} = 0$ otherwise. We limit the time period to one year, so it is (arbitrarily) assumed that land values are determined by spatially weighted asking prices in the preceding year. The matrix is row-standardised such that each row of the

33 The research strategy adopted in this paper does not explicitly deal with the issue of which functional form to use, but the qualitative evidence presented above suggests that particular features of the land, like visibility from the road, may indeed add a certain percentage to the value of a building plot. Although this evidence is far from conclusive, it suggests that the particular functional form that we have chosen is consistent with the way in which municipalities make adjustments for certain features of the land they offer for sale.

matrix sums to one. Thus, $\sum_j w_{ij} \ln P_{j,t-1}$ is a spatially weighted average of the asking prices of building plots in neighbouring municipalities in the previous year.

3.5 DESCRIPTION OF THE DATA

We have used the *Integraal Bedrijventerreinen Informatie Systeem* (IBIS) database to obtain information on land prices. IBIS is a national survey that annually records information for all industrial sites in the Netherlands. The IBIS survey gathers information from individual municipalities on all sites, larger than one hectare, which are identified for industrial and business purposes in an adopted local land use plan (*bestemmingsplan*).³⁴ IBIS has several features that makes it particularly useful for investigating the way in which municipalities determine asking prices of building plots for industrial and business development. First, it includes detailed information about the type of supplier, allowing us to restrict the analysis to sites where at least one building plot is offered for sale or lease by municipalities.³⁵ Second, the database lists minimum and maximum asking prices for building plots. Given the focus of this paper on the valuation behaviour of municipalities, we prefer asking prices over actual selling prices.

This study makes use of a file modified by the PBL for the period 1997–2008, because a detailed investigation of the quality of the original IBIS dataset led to several questions about its reliability.³⁶ The extract includes 7,256 sites where building plots are offered for sale by municipalities.³⁷ Since this file only contains sites where at least one building plot has been taken up for development, the amount of building land offered for sale by municipalities declines by 8 per cent compared to the original dataset. The data clearly

34 Not all land for industrial and business uses will be located on these sites and not all the land on these sites is actually used for manufacturing activities, as we explained earlier. Sites designated to accommodate only (higher order) office uses are not included in the survey.

35 IBIS distinguishes between building land offered by municipalities and port authorities and land offered by private land owners such as development corporations and commercial developers (ARCADIS & Stec Groep, 2009). Port authorities will not be included in the dataset that we use for analysis as we exclude all sea ports. The rationale for discarding sea ports is that IBIS data for these areas are unreliable (Beckers et al., 2012).

36 Various sites have been removed because they were included more than once, due to overlap with other sites or because they were erroneously listed as an industrial site (e.g. sites designated solely for offices and sites occupied by one firm only). In addition, information has been added for sites with missing observations in one or more years (Beckers et al., 2012).

37 The Wadden Islands, located just to the North of the Dutch mainland, are deleted to ensure the contiguity of the spatial weight matrix.

demonstrate that municipalities dominate this market segment, with 85 per cent of all building plots supplied by public developers in the period of interest. After deleting observations with missing or implausible values for important variables, the final sample consists of 5,526 sites.³⁸

The database provides listed asking prices per square meter of either freehold land, leasehold land or both.³⁹ Whenever data are available on both types of tenure, the freehold price is preferred. If prices of freehold land are not included (on some sites all land is offered leasehold) then the price of leasehold land is used. It occasionally occurs that information is only available for either minimum prices or maximum prices. In this case minimum and maximum prices are considered equal. Figures 3.1 and 3.2 present scatter plots of, respectively, minimum and maximum asking prices against the weighted average of the prices charged by neighbouring municipalities in the preceding year. These graphs reveal that spatial dependence is more important for minimum prices. The squared correlation coefficient suggests that we can explain between 58% and 67% of the variation in the maximum and minimum prices, respectively, by simply looking at the average asking prices in neighbouring municipalities.

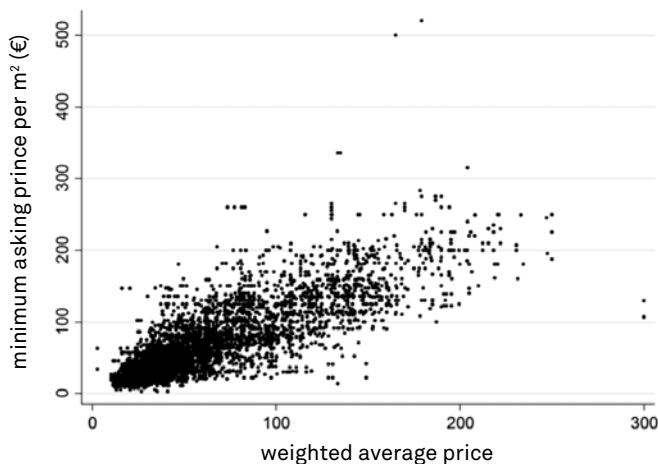


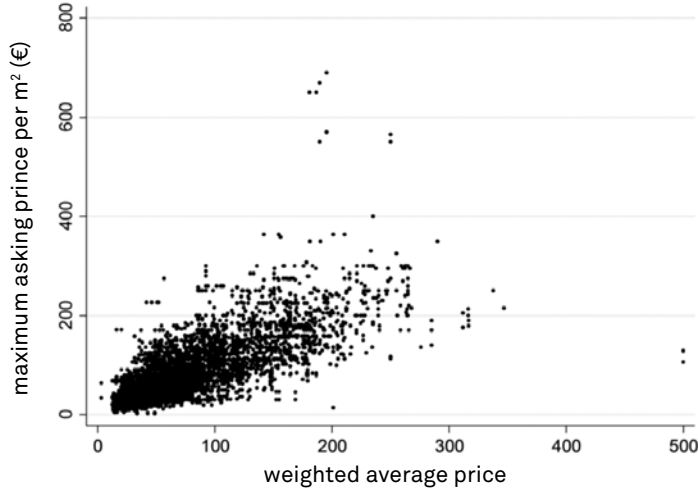
Figure 3.1
Scatter plot of
minimum asking
prices against the
weighted average
price

38 For several sites price information was unavailable. Also, observations with asking prices below 10 Euros have been discarded in case they were not situated in the Northern part of the Netherlands (provinces of Groningen, Friesland and Drenthe) or in the province of Zeeland. One explanation for missing price information is that the price of the land offered for sale had yet to be determined. Another explanation why municipalities did not provide this information is that it would weaken their bargaining position during negotiations with potential buyers (ARCADIS & Stec Groep, 2009, p. 26). It is therefore highly unlikely that neighboring municipalities had access to this information at the time that they determined the asking price. For this reason, we assume that missing values for the asking price will hardly affect our estimates of the extent of spatial dependency.

39 Since IBIS information is collected at the level of industrial sites, data about individual building plots are not available.

Figure 3.2

Scatter plot of maximum asking prices against the weighted average price



The IBIS file also records the principal use to which the industrial site is put and we use this information to capture the influence of the classification of the site on asking prices. Five categories of industrial sites are distinguished: sea port sites (excluded from the analysis), business parks, sites for warehousing and distribution, sites for heavy industries and, finally, sites that do not fall within one of these four categories – commonly referred to as ‘mixed use sites’. We derive our measure of competition from other municipalities from the IBIS dataset as well. This involves calculating for each municipality k the total amount of land immediately available for sale. Next, we add the amount of land readily available in neighbouring municipalities using a spatial weights matrix w_{kl} that indicates whether or not municipality k and l share a common border or node to calculate overall supply in the local market area. We then compute the competition intensity as follows:

$$\text{Competition}_k = \frac{\text{Supply}_k}{\text{Supply}_k + \sum_l w_{kl} \text{Supply}_l}$$

Thus, this measure depicts the municipalities’ share in the total amount of land available for industrial development in the local market area. A value near 1 indicates municipalities without immediate competition. Since restrictions on land supply (or lack thereof) might also directly influence the prices that municipalities think they can achieve, we calculate the overall amount of land that is readily available for industrial and business development in a particular

municipality and its neighbours. This indicator is expressed as a ratio to the amount of land on industrial sites already taken up by firms, a measure of the size of the local market.

Table 3.1
Descriptive statistics

VARIABLE	OBS.	MEAN	ST. DEV.	MIN.	MAX.
Minimum asking price per m ² (€)	5,526	69.07	50.72	2.88	520.00
Maximum asking price per m ² (€)	5,526	83.23	63.73	3.17	690.00
Visible from motorway (dummy)	5,526	0.22	0.42	0.00	1.00
Excellent motorway access (dummy)	5,526	0.22	0.42	0.00	1.00
Good motorway access (dummy)	5,526	0.25	0.44	0.00	1.00
Poor motorway access (dummy)	5,526	0.52	0.50	0.00	1.00
Heavy industry site (dummy)	5,526	0.06	0.24	0.00	1.00
Business park (dummy)	5,526	0.08	0.27	0.00	1.00
Warehousing and distribution site (dummy)	5,526	0.02	0.15	0.00	1.00
Mixed use site (dummy)	5,526	0.84	0.37	0.00	1.00
Land availability (share)	5,526	0.09	0.06	0.00	0.43
Competition intensity (share)	5,526	0.31	0.26	0.00	0.99
Core city (dummy)	5,526	0.18	0.38	0.00	1.00

We construct two variables that define the location of the industrial site in relation to the motorway network. First, a dummy variable is created that takes value 1 if the industrial site is intersected by a motorway (using a 100 metre buffer). The presence of a motorway in the immediate vicinity of a site implies that it will be visually prominent from the road. Second, we calculate the straight air line distance from each site to the nearest motorway junction. We use this information to categorize industrial sites in terms of access to the motorway network. Our classification is based on Geuting et al. (2011) and three dummy variables are constructed. The first variable indicates whether or not sites are located within the first 1,000 metres from a motorway junction (the ‘excellent’ access group). The second dummy variable indicates whether or not sites are located at a distance between 1,000 and 3,000 metres from the motorway junction (good access). The third variable identifies sites beyond 3,000 metres from the nearest motorway junction (poor access). Finally, data obtained from Netherlands Statistics (CBS) have been used to determine if an industrial site is located in a core city (referred to as a metropolitan area) or elsewhere in the Netherlands. The dataset is described in Table 3.1.

3.6 DETERMINATION OF ASKING PRICES - QUANTITATIVE EVIDENCE

This section presents the estimation results of the proposed model. The equation was estimated separately for minimum and maximum asking prices using ordinary least squares (OLS).⁴⁰ Table 3.2 reports the results with the minimum price as the dependent variable and Table 3.3 presents the results from the estimation with the maximum asking prices as dependent variable. We also show results for a standard hedonic specification without spatially lagged prices, together with some diagnostic tests for spatial dependence. The results from the spatiotemporal model reveal that spatial dependence plays an important role in the determination of land prices. The inclusion of a spatial autoregressive parameter in the model greatly enhances its explanatory performance as can be seen from the increase in the percentage of variance accounted for. In addition, the t-ratio of the spatially lagged dependent variable, ρ , is very large in both estimations, which confirms the results of the diagnostic tests for spatial dependence in the standard model. The robust LM test statistics are highly significant and point to the existence of both spatial lag and spatial error dependence. The latter may arise from omitted variables that follow a spatial pattern. The test statistic is much higher for spatial lag dependence and this suggests that spatial dependence pertains to the lagged dependent variable. The high positive value for ρ suggests that the prices charged by municipalities are strongly influenced by the prices at sites in neighbouring municipalities. The coefficient estimates reveal that for any 10% increase in the weighted average price of building plots offered in neighbouring municipalities, minimum and maximum asking prices on a given site will increase by 8.3% and 8.1% respectively.

40 Because the autoregressive parameter that we include in our model incorporates both temporal and spatial dependencies we can estimate the model using OLS (Can & Megbolugbe, 1997; Pace et al., 1998). Models that do not include the time dimension into the autoregressive term cannot be estimated using OLS because of the simultaneity bias problem. Such models are known as 'spatial autoregressive' or 'spatial lag' models (applications to real estate values can be found in Can, 1992; Kim, Phipps, & Anselin, 2003; Anselin & Lozano-Gracia, 2008). In a cross-sectional setting, simultaneity arises due to the two-way interaction between nearby properties. When the dataset consists of observations ordered in time, such models even have to assume that the price of a subject property is determined in part by the price of properties as yet unsold.

Table 3.2Estimation results for minimum asking prices per m²

VARIABLE	STANDARD MODEL		SPATIO-TEMPORAL MODEL	
	Coef.	Std. Err.	Coef.	Std.Err.
Constant	3.756	0.042 ***	0.580	0.082 ***
Visible from motorway	0.106	0.053 **	0.061	0.032 *
Excellent motorway access	0.224	0.057 ***	0.135	0.032 ***
Good motorway access	0.259	0.049 ***	0.114	0.033 ***
Heavy industry site	-0.327	0.072 ***	-0.149	0.042 ***
Business park	0.231	0.076 ***	0.191	0.043 ***
Warehousing and distribution site	0.071	0.117	-0.043	0.081
Land availability	-3.601	0.269 ***	-0.827	0.214 ***
Competition intensity	0.095	0.070	0.325	0.042 ***
Core city	0.274	0.053 ***	0.062	0.034 *
Weighted average price (ρ)			0.837	0.021 ***
Number of Obs.	5,526		5,526	
Adjusted R²	0.3408		0.706	
Robust LM (lag)	613.74			
Robust LM (error)	64.88			

Notes: Regressions include year fixed effects and a dummy if land is offered leasehold. Robust (clustered at the industrial site level) standard errors are reported. Significance levels are indicated by: * for 10 per cent, ** for 5 per cent and *** for 1 per cent.

Comparing the spatiotemporal model estimates with those for the standard model, it is apparent that the estimated coefficients are not much altered except that the local competition measure, the variable of particular interest to this study, is now significant at the 1% level of confidence. The results indicate that competition intensity has a positive effect on asking prices. A 1% point (0.01) increase in the municipalities' share in the total amount of land available in the local market area raises asking prices by 0.33 to 0.43%. The amount of land available for industrial and business development does appear to have a negative effect on asking prices. The estimate implies that an increase in the amount of land available for industrial development, relative to the size of the local market area, reduces asking prices. This suggests that asking prices depend critically on the presence or absence of competitive pressures between neighbouring municipalities. In local market areas where land availability and potential competition is restricted, municipalities seem to be more optimistic about the prices they can achieve for building land. In contrast, in local market areas where competition between municipalities is intense, they seem to assume lower selling prices.

Table 3.3Estimation results for maximum asking prices per m²

VARIABLE	STANDARD MODEL		SPATIO-TEMPORAL MODEL	
	Coef.	Std. Err.	Coef.	Std.Err.
Constant	3.803	0.042***	0.587	0.093***
Visible from motorway	0.155	0.053***	0.109	0.034***
Excellent motorway access	0.263	0.057***	0.170	0.035***
Good motorway access	0.294	0.050***	0.137	0.033***
Heavy industry site	-0.338	0.073***	-0.163	0.044***
Business park	0.249	0.075***	0.214	0.045***
Warehousing and distribution site	0.068	0.125	-0.053	0.076
Land availability	-3.025	0.266***	-0.538	0.208**
Competition intensity	0.136	0.067**	0.427	0.043***
Core city	0.303	0.056***	0.089	0.037**
Weighted average price (ρ)			0.819	0.023***
Number of Obs.	5,526		5,526	
Adjusted R²	0.343		0.684	
Robust LM (lag)	546.75			
Robust LM (error)	86.68			

Notes: Regressions include year fixed effects and a dummy if land is offered leasehold. Robust (clustered at the industrial site level) standard errors are reported. Significance levels are indicated by: * for 10 per cent, ** for 5 per cent and *** for 1 per cent.

All of the other independent variables display the expected sign and parameter estimates remain fairly stable across models. Maximum asking prices are significantly higher at sites that are visually prominent from a motorway. Interestingly, this variable is only marginally significant in the estimations with the minimum asking price as dependent variable. This finding is encouraging as we would not expect this variable to be significant in the estimation for minimum asking prices. Normally, only part of the building plots offered at a given site will be visible from the motorway network and it is only those plots that will command the price premium represented by the maximum price. That this variable still is significant at the 10% level may be explained by the fact that it partly picks up the effects of the accessibility measures: sites in close proximity to motorways will generally have good access to the motorway network. The two motorway access dummy variables exhibit a positive effect compared to sites outside the first 3 kilometres around a motorway, which implies that municipalities charge higher prices for sites that have easy access to the

motorway network. The results indicate that they also discriminate between different types of sites. Business parks command a premium compared to mixed use sites, whereas sites for heavy industries are lower priced. In contrast, sites for warehousing and distribution do not differ in any significant way from mixed use sites in terms of asking prices. Location relative to the core city in the region is shown to be important for both minimum and maximum asking prices. Prices are significantly higher at sites located in the core city.

3.7 CONCLUDING REMARKS

This paper has introduced a research approach that uses insights generated from qualitative research to specify an econometric model of industrial land values. Building on the behavioural tradition in real estate research, it has sought to address one of the main problems in the specification of hedonic pricing models, namely, that theory yields little guidance in the selection of the correct set of independent variables. The empirical segment of this research has presented evidence from the market for industrial land in the Netherlands. Interview evidence suggests that municipalities consider only a limited number of features of the land in the valuation process and that the primary source of information in setting asking prices relates to the prices charged in neighbouring municipalities. As a result of the practice of using comparable evidence, spatial dependence is likely to arise in this market segment. Indeed, the estimation results indicate that spatial dependence is strongly present in the Dutch market for industrial and business land, which provides some additional support for the implications derived from the interviews. The estimation of the model allowed us to test another important inference from the qualitative data: that prices will be determined in part by the extent of local competition that municipalities face from each other. Although one may argue that municipalities will not always exercise any monopolistic powers that might arise from the absence of local competitors – they might be driven by other than profit motives – the results from the regressions are consistent with the qualitative evidence.

There is a widespread perception in the Netherlands that industrial land is normally sold below its market value (given by the residual value) due to the presence of local competitive pressures between municipalities (Needham & Louw, 2006; Van der Krabben & Buitelaar, 2011; Van Dinteren, 2012). It is argued that these low price levels have several undesirable side effects. One of these effects is that commercial developers are largely absent in this market segment because the prices that they could charge are too low to compensate

for the risks. Another is that in areas where land prices are heavily discounted, firms have no incentive to refurbish and improve their existing premises. This contributes to the decay of existing sites and results in industrial land being developed at low densities. The examinations undertaken for this paper were not designed to permit conclusions as to whether land values are actually below market values, but we have demonstrated that asking prices are indeed crucially dependent on the extent of competition that municipalities face from each other. This finding shows that in local markets, where monopolistic competition is a better approximation than perfect competition, developers can influence the price of the product they offer for sale.

Following Bromiley (1986), the empirical approach adopted in this paper can be applied in two distinct ways. On the one hand, the approach can be used to improve and refine existing hedonic pricing models by determining *a priori* what utility-bearing characteristics should appear in the regression or how spatial submarkets should be identified (using perceived boundaries) as Munro, Maclellan and others have previously suggested. In this regard, some opportunities still exist for improving the model developed in this paper as it does not account for submarket existence. This is an potentially fruitful avenue for future research. Along similar lines, the specification of models that incorporate a spatial autoregressive parameter could be improved by embracing prior evidence about the number of comparable sales that are normally selected and the criteria that are used for making judgements about comparability of sales in time, space and quality, since there is little formal guidance in the choice of the 'correct' spatial weights (Anselin, 2002, p. 259). Such evidence could be gathered by observing the comparable sales selection process either in real world situations or the laboratory (see e.g. Diaz, 1990b) or by asking expert appraisers and potential sellers and buyers about their methods of price calculation. On the other hand, the research approach can be used to develop a model that better captures the actual processes whereby real estate values are formed. As such, it can be thought of as an independent model-building technique in order to provide an alternative to conventional hedonic pricing models.

Corresponding to the considerable growth of spatial econometrics from the 1990s onwards (Anselin, 2010), empirical investigations of housing values that incorporate spatial dependence into model specification and estimation have increasingly become commonplace in the real estate literature, leading to so-called spatial hedonic models (examples include Can & Megbolugbe, 1997; Basu & Thibodeau, 1998; Pace et al., 1998; Gillen, Thibodeau, & Wachter, 2001; Kim et al., 2003; Anselin & Lozano-Gracia, 2008). Although the comparable-sales approach is widely employed in residential real estate appraisals by both

expert appraisers and prospective buyers and sellers, only few of these studies explicitly acknowledge that spatial dependence arises among housing values due to this practice.⁴¹ Even fewer have considered the consequences for hedonic pricing theory. Nevertheless, these implications might be potentially important.

The practice of using comparable sales is a clear violation of the behavioural assumptions of standard hedonic pricing theory, namely, that in order to make valuation judgments buyers and sellers acquire information about the characteristics of the subject property only (see Rosen, 1974, p. 50). Patton and McErlean (2003, 2004) present a rare exposition of this issue in the context of the agricultural land market (also see Maddison, 2009). Outside the real estate literature, the new behavioural economics oriented work of Camerer and Loewenstein arrives at a similar conclusion. They contend that the widespread use of the sales prices of nearby and similar houses in the determination of list prices does not correspond well to the expected utility framework (Camerer & Loewenstein, 2004, p. 37). Patton and McErlean (2004) suggest that the standard hedonic model should still be the point of departure in modelling price determination. If this model is then found to be inadequate, the model has to be re-specified to allow for spatial dependence, which implies that the fundamental assumptions of hedonic theory do not hold. This paper has followed a rather different approach. By using insights generated from prior qualitative studies we do not have to fall back on such indirect inferences from the data to determine the type of information that is actually used in the valuation process.

41 Two other reasons are typically provided in the literature (see Can, 1992; Can & Megbolugbe, 1997; Gillen et al., 2001). The first one is substantive in nature and is related to proximity externalities that capitalize into housing prices, such as surrounding uses that affect the value of a given house or housing improvements and repairs that influence values of nearby properties. The other reason is associated with model misspecification resulting from omitted structural and neighbourhood variables, measurement errors and incorrect specifications of the functional form.

4 COUNTERING DECLINE OF INDUSTRIAL SITES



Abstract

Local economic development is a much used tool for the regeneration of urban areas. Although the designation and effectiveness of local economic development policies are studied extensively in existing literature, the question whether these policies are aimed at the areas that are really in need of these policies remains relatively understudied. This question is answered using the case of industrial sites in the Netherlands. This particular type of urban area in the Netherlands has experienced problems with rapid urban area decline and has therefore been targeted by various area-based regeneration initiatives for many years. The economic performance is the main justification for the designation of industrial sites that are in need of regeneration, but are the industrial sites targeted for regeneration really the ones that underperform economically? (Multinomial) logistic regression analysis is used to answer this question. Differences in economic performance (measured by growth in employment, growth of the number of companies and growth of property values) between industrial sites that are targeted for regeneration in two different rounds of regeneration initiatives and non-targeted sites are studied. The analyses show that the differences in economic performance are negligible between these groups, indicating that other criteria, such as political and strategic decision making, influence the decision by policy makers to target industrial sites for regeneration, making it at least doubtful that public money for the regeneration of industrial sites is always used for what it is meant for.

Beekmans, J., Ploegmakers, H., Van der Krabben, E., & Martens, K. (forthcoming). Countering decline of industrial sites: Do local economic development policies target the most needy places? Urban Studies.

4.1 INTRODUCTION

In the context of the urban development, the term decline is used to describe undesirable changes, such as job losses resulting in growing unemployment, social exclusion, physical decay and worsening living conditions (Lang, 2005, p. 2). The focus of this study is on decline at the level of urban areas, more specifically on decline

of industrial sites⁴². These areas are often targeted by national, regional or local government initiatives to counter the negative effects of decline, mostly through policies that stimulate local economic development and finance physical improvements. The nature of these initiatives differs. In this paper we analyse in more detail studies on Enterprise Zones (EZ) and Tax Increment Financing (TIF) as these are much used programmes by which governments have tried to regenerate industrial areas that are referred to as 'blighted' or 'economically distressed'. Although problems may vary and definitions of urban blight, decay, decline and other terms overlap considerably, these all express processes similar to the ones mentioned by Lang (2005) above. From here, urban areas that experience such problems are referred to as 'declined'. The problems reflecting decline are various and include for example a '*fall in property values and general development activity*' (Turok, 1992, p. 361) and social problems related to '*increases in inner-city unemployment and poverty*' (Broadway & Jesty, 1998, p. 1423).

Area-based regeneration initiatives aim to counter these negative effects, for example through: '*promot[ing] economic development in specific locations, typically economically-distressed urban areas*' (Neumark & Kolko, 2010, p. 1), '*fostering and facilitating market driven urban renewal*' (Jolin, Legenza, & McDermott, 1998, p. 81) and '*target[ing] various economic development incentives toward specific blighted areas*' (Greenbaum & Engberg, 2004, p. 315). These aims illustrate that the justification of area-based regeneration initiatives is often found in increasing the economic performance of urban areas, mostly through local economic development and this has led to a large literature on the effectiveness of area-based regeneration initiatives such as EZ and TIF (see e.g. Bondonio & Engberg, 2000; Greenbaum & Bondonio, 2004; Greenbaum et al., 2010; Neumark & Kolko, 2010). The question whether regeneration initiatives actually target the most needy and distressed areas has not been researched much (Greenbaum & Bondonio, 2004; Greenbaum et al., 2010). Different authors nevertheless stress the relevance of such a question for economic development policies (Bartik, 1991, 1994; Anderson & Wassmer, 2000; Sridhar, 2001; Peters & Fisher, 2002) so it is the question whether regeneration initiatives target the right areas that we address in this paper.

This paper empirically examines whether regeneration initiatives for industrial sites are targeted at the industrial sites that are actually in need of regeneration. With the economic justification of these initiatives in mind, the

42 An industrial site is defined as a site which, according to the land use plan, is suitable for the functions of trade and industry and commercial and non-commercial services and covers at least one hectare. This also includes a limited number of (parts of) locations that are zoned and being used for offices (IBIS 2012).

areas that are targeted should be the ones that underperform on variables that are related to economic performance. The empirical part of this paper focuses on regeneration initiatives for declined industrial sites in the Netherlands. It consists of logistic regression analyses that are used to find possible differences between industrial sites that were targeted for regeneration and sites that were not. In the Netherlands, industrial sites have appeared firmly on the agenda of policy makers due to problems with rapid decline (Van der Krabben & Buitelaar, 2011). This has led to large government funded regeneration initiatives for industrial sites, which consist mainly of subsidies for physical improvements of infrastructure, the public and private space. The exact nature of the regeneration initiatives studied in this paper is explained in more detail below. Research by Ploegmakers and Beckers (2015) indicates that these have a negligible impact on various indicators of local economic development, such as growth of jobs, number of firms and property values, leading to the question whether these policies actually target the right areas.

The remainder of this paper is set up as follows. In the next section we elaborate on existing research on area-based regeneration initiatives and focus on the question whether local economic development policies are aimed at the right areas. Furthermore, the process of decline of industrial sites, the rationale behind, and nature of current regeneration initiatives in the Netherlands are explained in more detail. Section three provides the description of the data that was used to perform logistic regression and multinomial logistic regression, the results of which are presented in section four. The final section concludes.

4.2 TARGETING INDUSTRIAL SITES FOR REGENERATION

4.2.1 INTRODUCTION

Area-based regeneration initiatives are an important means to stimulate local economic development in declining urban areas. Two different mechanisms through which local economic development typically is stimulated can be distinguished in the literature: business incentives and physical improvements (see e.g. Ho, 1999; Bartik, 2004; Rhodes et al., 2005; Tyler et al., 2013). Examples of physical improvements include the provision of new infrastructure, investments in public space, refurbishments of derelict private land and other property, etc. Under business incentives we distinguish a variety of measures without a clear physical component such as tax breaks for firms locating in an area, business loans, enterprise support, skills training for employees and businesses, etc. Regeneration programmes for industrial sites

in the Netherlands are publicly funded and consist almost entirely of financing physical improvements. Well-known types of area based initiatives in other countries that have also been studied extensively in urban literature, such as TIF and EZ, resemble Dutch regeneration programmes in the sense that they are also specifically aimed at certain areas. While physical improvements are an important aspect of TIF, EZ programmes are usually aimed at attracting new businesses or stimulating investments by firms in the targeted area (Sridhar, 2001) although most programmes also offer subsidies for infrastructure improvements (Greenbaum & Engberg, 2004). This makes both types of area-based regeneration initiatives interesting for the present paper.

A substantial part of the studies on TIF and EZ focuses on questions of effectiveness by empirically evaluating different programmes for metropolitan areas, states or cities. For EZ these include for example Bondonio and Engberg (2000), Sridhar (2001), Greenbaum and Engberg (2004), Busso, Gregory, and Klyne (2010) and Neumark and Kolko (2010). Examples of studies that have focused on the effectiveness of TIF include Man (1998), Man and Rosentraub (1998), Dye and Merriman (2000), Byrne (2010), Weber et al. (2003) and Lester (2014). As mentioned earlier, our aim is not to add yet another evaluation of a certain area-based regeneration programme. Instead, we focus on the question whether an existing regeneration programme indeed targets the areas that are in need of regeneration. Below, we elaborate studies on TIF and EZ. Although most studies focus on effects and evaluations, some studies also pay attention to justification for the programmes they study and elaborate for example what municipalities adopt TIF or what the characteristics of designated EZ districts are. TIF and EZ are not completely similar to Dutch regeneration programmes but it is especially these issues we are interested in and therefore the exact nature of the programmes is less relevant. At the end of this section, the nature of regeneration programmes in the Netherlands is explained in more detail.

4.2.2 TARGETING THE RIGHT AREAS

Many studies perform evaluations or focus on effectiveness of area-based regeneration initiatives, as illustrated above. There are also several authors that have focused explicitly on the importance of targeting the most needy areas. Bartik (1994) has assessed different state and local economic development programmes when developing an advice on how these programmes could play a constructive role in the development of the urban economy. The focus is on programmes in which business incentives, or what he calls ‘customized business assistance’ programmes, play an important role. This type of local economic development programmes covers

many different policies, ranging from financial incentives such as property tax abatements to capital market policies such as government-financed loans for new businesses and their main focus is to create employment. An important goal of these local economic development programmes is *'to explicitly target economic development on distressed areas'* (Bartik, 1994, p. 17). Additional jobs in distressed areas can be more valuable than additional jobs in areas that already are performing well. In that way redistributing economic activity to distressed areas could increase the overall economic efficiency, although this might be difficult to realise deliberately through policy. In an earlier work Bartik (1991) already argued that especially job creation is more efficient in distressed areas that already typically have high unemployment rates.

There are several other authors that deliver the argument that local economic development policies should maintain focus in order to keep being effective. Peters and Fisher (2004) for example state that it is politically difficult to maintain focus for development programmes and that when over time targeting erodes, a wider range of localities is granted similar tools to compete with each other for new investments. Eventually, this will disadvantage the older, more distressed areas as greenfield sites and smaller congested brownfield sites are more easily given incentives. Greenbaum et al. (2010) add to this, stating that from a policy perspective, it is important to keep focusing on how incentives should be targeted as political pressures can easily lead to the spread of programmes to less economically justified places over time, influencing programme effectiveness.

Wassmer and Anderson (2001) agree with Bartik (1994) that especially blighted areas should be targeted. The empirical results of their study of locally offered development incentives to attract businesses in the Detroit area leads to the conclusion that targeting the most blighted areas is preferable over two other possible options: a non-restricted use of local incentives by local policy makers or to ban all local development incentives. The first might lead to efficiency problems since *'as time passes communities are more likely to emulate each other and offer manufacturing abatements just because others are using them'* (Wassmer & Anderson, 2001). If this is indeed the case, eliminating all local economic development policies might be an option to consider, but the authors prefer targeted use of local incentives for areas that are blighted, which they define in terms of employment figures and property values. This preference, although not specified by the authors in more detail, is shared by Dutch policy makers when it comes to local economic development, as will be elaborated in the following section.

Sridhar (2001) draws a similar conclusion in her benefit-cost analysis for a regional development programme, the Ohio Enterprise Zone Program. Her

analysis shows that the creation of jobs will be more efficient in areas with high levels of unemployment. The use of more selective designation criteria could also be helpful as it reduces the competition between zones. It will make clearer which areas are eligible to become an EZ and which areas are not. She therefore argues that the selection of areas that are eligible for tax incentives aimed at regional economic development should be based on a thorough assessment of distress criteria. In their review of local economic development policies, Peters and Fisher (2004) thus conclude that, when effectively aimed at poorer areas, targeted programmes are the best that the economic development industry has to offer. Greenbaum et al. (2010) have empirically studied the geographic distribution of economic development tax incentives in Ohio and find that *'policies are missing the mark if they are indeed intended to target areas of distress or particular industries'* (Greenbaum et al., 2010, p. 154).

Many studies on TIF focus on effectiveness (see e.g. Anderson, 1990; Dye & Merriman, 2000; Weber et al., 2003; Lester, 2014). An important difference between these studies and the present paper is the explicit focus on the question what types of areas are targeted by area-based initiatives and whether these are indeed the right areas. This is clearly illustrated by the fact that in many of the existing studies mentioned above, probability scores for characteristics of the targeted areas are estimated using probit or multinomial regression analysis, only to control for sample selection bias, as a first step in evaluating the effects of local economic development policies. In this paper we estimate similar probabilities, but explicitly focus on these scores as the most important outcome to conclude on what types of areas are targeted.

Studies on EZ have focused more explicitly on the question what areas are targeted. For local economic development programmes that target distressed areas, these distressed areas – by definition – are likely to have higher levels of economic distress than non-designated areas (for evidence, see: Bondonio & Engberg, 2000; Greenbaum & Bondonio, 2004; Bondonio & Greenbaum, 2007). Therefore, any study that compares the levels of economic outcomes for targeted areas versus some comparison group of areas is likely to be biased towards finding negative effects of the programme, as levels of economic outcomes are obviously positively correlated over time, and therefore the targeted areas would have higher levels of distress than their comparison group in the future without the program's intervention. It is not as obvious that changes in economic outcomes will differ between targeted areas and comparison non-targeted areas. For targeted areas, a number of studies in the United States have attempted to evaluate enterprise zones by comparing the performance of enterprise zones to matched non-zone areas. Several studies, including the ones mentioned above, have explicitly made

such matches using estimates of the ‘propensity score’: that is, estimates of the probability of a given area (in this case, a postal ‘zipcode’ or routing code) being designated as an enterprise zone. These studies find little or no effect of enterprise zone designation on the growth of local business activity. In addition, as mentioned before, the propensity score estimation suggests that enterprise zone designation is not strongly correlated with previous area growth, which increases the odds that the estimates reveal the true effect of enterprise zone designation (Bartik, 2004).

Two important assumptions from the studies elaborated above also apply to Dutch regeneration initiatives. First, stimulating employment leads to economic growth (economic growth is even often measured in terms of employment growth). Second, in order for local economic development policies to be effective, the right areas should be targeted. Based on the justification used for the policies and the findings from the empirical studies above, the right areas are the areas that experience the largest decline-related problems and are underperforming economically. Nevertheless, the above review of empirical studies shows that political and strategic reasons should also be taken into account as a possible explanation of why an industrial site was designated as in need of regeneration while other sites are more eligible to be targeted according to the original aim of regeneration programmes. This leads to the hypothesis that the industrial sites that are actually targeted for regeneration initiatives are not necessarily industrial sites that underperform in terms of the variables that represent the distress criteria mentioned above. In fact, the Nicis Institute (2009) notes that political and strategic reasons play an important role in the decision to target industrial sites for regeneration: *‘If grants are available, not much effort is needed to designate a site as in need of regeneration’* (Nicis Institute, 2009, p. 52: translation by authors). In the next section decline and regeneration of industrial sites in the Netherlands are elaborated to explain this in more detail.

4.2.3 DECLINE AND REGENERATION OF INDUSTRIAL SITES IN THE NETHERLANDS

In their work on industrial sites in the Netherlands, Louw et al. (2009) distinguish five categories of problems that are related to decline of industrial sites. These are problems regarding private property, appearance, accessibility and infrastructure, (inefficient) use of space, and environmental issues (ETIN Adviseurs, 2003; Louw et al., 2009). The decline of individual private property plays an important role in the overall decline of industrial sites in the Netherlands (and elsewhere). As time passes, all property is subject to decline.

This process can go faster under the influence of decreasing accessibility, the diminishing quality of public space and increasing unsafety, since these may lead to disinvestments by owners of private property. In the case of industrial sites in the Netherlands, the abundant supply of new industrial sites at relatively low prices has led to further disinvestments in the existing stock of industrial property (PBL Netherlands Environmental Assessment Agency, 2009b; Van der Krabben & Buitelaar, 2011). In a wider context, Healey has also made the link between urban decline and the condition of property:

The conventional economic assumption is that if the overall level of economic activity in a place falls, the amount of wealth to invest in property and the quantity of demand falls. As a result, land and property values fall. This discourages further investment both in new development and in maintenance of the existing stock (Healey, 1991, p. 100).

The physical appearance of industrial sites is strongly related to the decline of private property, which makes up an important part of any industrial site. Physical appearance is also closely connected to the public infrastructure and public space of an industrial site. Government investments are usually targeted at the quality of the public space and, infrastructure, which is almost exclusively provided publicly and can also have an important impact on the appearance. The effect on the investment behaviour of private property owners of public investment is potentially large. The justification for public investments at least seems to rely on this relationship for a large part (Ploegmakers & Beckers, 2015). Public investments are not only a goal, but are seen as a means through which private property owners can be persuaded to invest in their property, but also in new economic activities.

The third category of problems concerns accessibility. Each firm has different demands of accessibility: some companies should be able to easily transport heavy goods over water or via rail, whereas for others easy car accessibility and abundant parking for customers and employees is essential. Many of the declined industrial sites in the Netherlands face problems with poor infrastructure and accessibility. Demands regarding infrastructure may change over time, for instance when it comes to the demands regarding infrastructure for information technology purposes. Industrial sites should therefore not only offer physical, but also the right digital infrastructure.

Fourthly, inefficient use of space could be an indication of decline of industrial sites in the Netherlands. In many urbanised areas, (open) space is a valuable asset and high vacancy rates and inefficient lay-out of existing industrial sites are therefore regarded as undesirable. Both inefficient use of

space and vacancies in a certain part of the site can have a negative effect on the rest of the industrial site, causing a negative spiral and leading to decline.

The final category concerns environmental issues. This does not only concern contamination of soil, but also nuisance because of smoke, fumes or noise. Furthermore, the presence of companies that pose a risk to the environment, for instance because they produce chemicals or attract a lot of transport, might cause an industrial site to decline, most notably because it makes the location of a site obsolete, when for instance residential areas located nearby have been developed.

Normally industrial sites are targeted for regeneration by municipalities when these areas are faced with problems elaborated above. Typical aspects of regeneration programmes include physical improvements of infrastructure, the public and private space. The latter may include relocating undesired activities and acquiring and demolishing obsolete property to provide new building land for firms looking to locate in redeveloped parts of an industrial site. Firms are also stimulated to form co-operations to manage the public space. The majority of these measures are funded through grant programmes from the national and provincial government. The funding schemes available range from broad urban regeneration programmes to grant funds especially for specific physical improvements such as infrastructure. There are special grants for soil remediation in case of contamination but this is only the case for a relatively small number of industrial sites (Ploegmakers & Beckers, 2015).

Ploegmakers and Beckers (2015) have studied the effects of regeneration initiatives for industrial sites in the Netherlands, but in their study the issue whether these initiatives are aimed at the right industrial sites is not addressed. They study municipal master plans to find the most frequently cited goals of regeneration initiatives. Two frequently cited goals are 'attraction and retention of firms' and 'increasing the number of jobs', indicating that the assumption that employment leads to economic growth presented earlier, underlies Dutch regeneration policies. The goals of regeneration programmes are in line with the categories distinguished by Louw et al. (2009) elaborated above. Regeneration initiatives aim to generate positive effects on one or more of these categories. In the next section the dataset is introduced that is used to answer the question whether regeneration initiatives indeed focus on the most needy industrial sites.

4.3 DATA DESCRIPTION

In this section the dataset for the empirical study is presented and the explanatory variables are introduced. Two logistic regression analyses are performed. First, standard logistic regression analysis is used to find if the probabilities for characteristics of industrial sites differ between industrial sites that were targeted for regeneration and non-targeted sites. The second, multinomial logistic regression analysis, allows a more detailed analysis of differences for characteristics within the group of targeted industrial sites. Although we make use of a longitudinal dataset, the nature of the dependent variable only permits an analysis of cross-sectional variation in the decision to target a particular area for regeneration. We do make use of the panel characteristics of the dataset to calculate changes in the main variables of interest over a longer period of time (1997-2008) preceding the decision to target the area. Clearly, it would be preferable to undertake a longitudinal analysis. However, we are able to add a time dimension to the data. In 2009 the national government and lower-tier governments agreed on the future direction of regeneration policies. This agreement distinguished two rounds of regeneration. The first round, which would be implemented between 2009 and 2013, was targeted at 6,500 hectares of industrial sites experiencing decline. The second round would target 9,300 hectares and had to be finished in 2020.

The information on which sites had to be targeted during the first round comes from lists provided by the provinces. Provinces produced these lists together with municipalities. They are based on municipal knowledge and in many regions private consultancy firms were hired to make a general assessment of the condition of all industrial sites. Unfortunately, such lists are not available for the round two regeneration programme foreseen to be implemented in the period 2014-2020. Therefore, we rely on the Dutch national database on industrial sites (IBIS), which tracks the amount of land in need of regeneration on an annual basis. Sites are assigned to the group of second round sites if they were suffering from some form⁴³ of decline according to the 2008 annual IBIS assessment, but not targeted for regeneration during the first round.

The characteristics of industrial sites are the explanatory variables in our dataset. Different existing databases were used to construct this dataset. IBIS contains for example data on size, land prices and location and was combined

43 Four distinct processes of decline are identified: (1) physical deterioration due to overdue maintenance; (2) functional obsolescence due to changing occupier demand requirements; (3) social obsolescence due to changing regulations (environmental, safety, working conditions); and (4) locational obsolescence due to changes in the immediate vicinity of the site (incompatible land uses).

with data on property values obtained from Netherlands Statistics (CBS)⁴⁴ and data gathered in cooperation with the Netherlands Environmental Assessment Agency (PBL)⁴⁵. This provided the opportunity to construct a rich database on all industrial sites in the Netherlands.

Research shows that municipalities to a large extent apply the same criteria to decide whether an industrial site faces decline and is in need of regeneration (for these criteria see PBL Netherlands Environmental Assessment Agency, 2009a; Ploegmakers & Beckers, 2015). The criteria and guidelines set at the national level provide certainty that the decision by policy makers to target an industrial site is made on comparable grounds and should not differ substantially from one (municipal or regional) policy maker to another. Our analysis is thus based on the assumption that the most-declined industrial sites are targeted. Municipalities and regional government, however, can have other reasons to target industrial sites within their jurisdiction, or set their own priorities based on how many industrial sites are declined. Municipalities with no declined industrial sites might still target such areas to try to receive subsidies. To control for regional differences in interpretation of the national guidelines, provincial dummies were included in the analyses.⁴⁶

Two types of explanatory variables are distinguished: control variables and performance variables. The first category is divided into site-specific characteristics and regional characteristics. These variables might influence the probability that a certain industrial site is targeted for regeneration. They are mostly static and are not used as justification for regeneration policies. Examples of such characteristics are age, travelling time to/from the nearest motorway exit and urbanisation rate. Older industrial sites are probably more likely to be targeted for regeneration, but it is impossible for policy makers to change this characteristic. The influence of these variables is controlled for by including these into the analysis. The second category corresponds to the economic distress criteria. These are called performance characteristics as they express the economic performance of the industrial site before interventions are implemented. Different indicators of economic activity can be found in

44 The micro data on property values provided by Netherlands Statistics (CBS) are based on the dataset 'Waarde onroerende zaken' (Property value), provided by the Dutch municipalities.

45 An important dataset that was used in cooperation with PBL is the LISA database. It contains information on employment and type of economic activity on the level of individual addresses. In cooperation with PBL, IBIS geo-referenced data on the location of industrial sites was linked with various other databases to construct the variables used in this research. These include topographical maps to assess the age of industrial sites, land use maps from Netherlands Statistics (CBS) to assess other land uses in the vicinity of industrial sites, NAVTEQ data to calculate accessibility and an existing classification by CBS for urbanisation rate.

46 Furthermore, a model with municipal dummies was also estimated. This did not change the outcome of the analyses, leading us to the conclusion that our model does not suffer from noise due to the 'nested' selection process of industrial sites.

studies that were reviewed in the previous section. Employment figures and the number of companies in the targeted area are central in almost every study on local economic development. Wassmer and Anderson (2001) further take into account property taxes paid (as an indicator for property values) as a measure of economic activity. These criteria correspond with negative developments that the regeneration initiatives typically aim to counter: loss of jobs and a diminishing tax base. Following Ploegmakers and Beckers (2015), growth of jobs, growth of the number of companies and the growth of property values are used as these are important indicators of economic performance which in turn is the main justification for regeneration initiatives of industrial sites in the Netherlands.

The explanatory variables and the expected relationship with the dependent variable included in the analyses are the following. Accessibility is measured by the travelling time to/from the nearest motorway exit. Industrial sites that are located closer to a motorway have better accessibility and are therefore less likely to be targeted. The variables land use residential and land use open space are included in the model to control for functions in the direct surrounding of the industrial site. Residential neighbourhoods in the vicinity of an industrial site may lead to nuisance and environmental hazards, positively affecting the chance of being targeted. Following this line of reasoning, a negative relation is expected between open space and targeting. Age is included due to the fact that older industrial sites are hypothetically more likely to be targeted. The variable type of industrial site is included to control for the influence of the presence of certain types of firms.⁴⁷ Industrial sites with a large share of manufacturing could be more likely to experience decline and be targeted for regeneration. For instance, because firms in this sector recently have lost more jobs. Number of jobs and number of companies represent the size of industrial sites to control for large and smaller industrial sites. Jobs per hectare is included in the model as the representation of efficiency of land use. As described above, inefficient use of land is one of the categories of problems that is related to decline. It is expected that municipalities consider industrial sites with small numbers of jobs per hectare less efficient in terms of land use. Increasing the efficient use of land is often mentioned as a goal of regeneration policies and a the number of jobs per hectare therefore is expected to influence the municipal decision to target an industrial site for regeneration.

Environmental classes are included to control for the presence of companies that have a potentially large effect on environmental issues,

47 The different types of industrial sites are based on the types of companies present at the industrial site. If for example >50% of firms located on an industrial site are manufacturing firms, the site is characterised as a manufacturing site. Mixed-use sites do not contain other uses such as residential or leisure, but applies to sites that contain no absolute majority of a certain type of firms.

including noise, fumes or external hazards. This often concerns large industrial installations or (chemical) plants and these companies are not easily moved to another location. Their present location on an industrial site should therefore be maintained in the best possible way and regeneration is used to guarantee this. A second possible option is that these companies cause more environmental issues and this increases the need for regeneration initiatives to counter these negative effects. Seaports are included to control for this specific type of industrial site. These types of industrial sites typically have a low number of jobs per hectare. Average property values are added to control for low quality of public space and private property. A low property value per hectare is an indication of low overall quality and therefore might influence the assessment of targeting.

Three regional characteristics are added. Urbanisation rate is included to control for possible differences between urbanised milieus industrial sites can be located in. Three categories are distinguished: urban agglomeration, city region and outside city region. Within urban agglomerations the necessity to regenerate existing industrial sites is expected to be higher than in more rural municipalities outside city regions as pressure on maintaining the quality of the built up space is higher in more urbanised areas. Scarcity is calculated as the ratio of readily available and land currently in use for industrial sites. This variable is included to investigate the often-suggested relation between the (cheap) supply of new land for industrial sites and the occurrence of decline and the subsequent need for regeneration. Although not studied empirically, it is thought that when new land for industrial sites is cheap and easily available, firms are less willing to invest in maintenance at their present location. A high ratio means high levels of scarcity and a negative relation between this variable and targeting is therefore expected. Finally, we have added a regional (provincial) dummy to control for provincial policy makers' decisions to target industrial sites for regeneration.⁴⁸

Table 4.1 lists the explanatory variables and descriptive statistics along with the results of analyses of the variances of means. The results show there are noticeable significant differences between the mean values of targeted and non-targeted industrial sites. Two of the performance characteristics have significantly different mean values. The mean differences between round 1 and round 2 targeted sites show less differences. The regional dummies show large significant differences, indicating the number of industrial sites targeted differs per province.

48 Since policy makers eventually decide which industrial sites are targeted, non-economic decisions by policy makers might introduce noise into our results. Including this variable controls for this possible effect. Another model which included municipal dummies was also estimated. Results indicate that policy makers decisions do not influence the model's results. For brevity, regression results are not reported, but are available upon request.

Table 4.1

Descriptive statistics of explanatory variables in dataset and t-test results for differences in variance of mean values between targeted and non-targeted sites and round 1 and round 2 targeted sites

VARIABLE	NON-TARGETED SITES (n=817)	ALL TARGETED SITES (n=905)	ROUND 1 SITES (n=446)	ROUND 2 SITES (n=459)
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
Site characteristics				
Accessibility	6.12 (5.13)	6.40 (5.34)	7.12 ** (6.16)	5.70 (4.31)
Land use residential (ha)	1.41 (1.28)	1.65 ** (1.42)	1.31 ** (1.19)	1.89 (1.54)
Land use open space (ha)	2.61 (1.87)	1.99 ** (1.69)	2.10 (1.70)	1.98 (1.67)
Age (0/1)				
1990s or after	0.16	0.05 *	0.04	0.05
1980s	0.27	0.12 **	0.16 **	0.09
1970s	0.19	0.21	0.19	0.23
1960s	0.19	0.24	0.24	0.24
Pre 1960s	0.18	0.38 **	0.37	0.39
Type of industrial site (0/1)				
Mixed use	0.24	0.39	0.41	0.37
Consumer services	0.05	0.04	0.03	0.05
Financial services	0.07	0.04 *	0.03	0.04
Logistics	0.12	0.09	0.09	0.10
Manufacturing	0.49	0.43	0.43	0.43
Miscellaneous	0.02	0.01 *	0.01	0.01
Number of jobs	924.31 (2217.41)	1326.36 ** (2200.96)	1742.43 (2747.17)	926.00 (1378.21)
Number of companies	46.96 (73.13)	73.48 ** (101.24)	91.29 ** (119.59)	56.28 (75.63)
Jobs per hectare	68.15 (245.95)	56.18 (74.32)	55.00 (74.38)	57.34 (74.25)
Environmental impact class (0/1)				
Class 5	0.08	0.16 **	0.22 **	0.11
Class 4	0.41	0.48 **	0.49	0.47
Class <4	0.50	0.36 **	0.29 **	0.42
Sea port (0/1)	0.02	0.01	0.01	0.02
Mean property value	664.739 (564.628)	594.303 ** (393.576)	590.636 (354.307)	597.823 (428.193)

Table 4.1 – continued

Regional characteristics				
Scarcity	0.93 (0.04)	0.93 (0.04)	0.93 ** (0.04)	0.94 (0.03)
Urbanisation rate (0/1)				
Metropolitan agglomeration	0.21	0.23	0.19 *	0.26
City region	0.17	0.18	0.17	0.18
Outside city region	0.62	0.59	0.64 *	0.56
Province (0/1)				
Groningen	0.03	0.04	0.07 **	0.02
Friesland	0.07	0.06	0.07	0.05
Drenthe	0.03	0.02	0.04 **	0.01
Overijssel	0.09	0.09	0.11 *	0.07
Flevoland	0.02	0.03	0.04 **	0.01
Gelderland	0.14	0.13	0.10 **	0.16
Utrecht	0.04	0.06 *	0.11 **	0.02
Noord Holland	0.07	0.13 **	0.10 **	0.17
Zuid Holland	0.02	0.15 **	0.14	0.16
Zeeland	0.04	0.04	0.07 **	0.01
Noord Brabant	0.13	0.17 *	0.08 **	0.26
Limburg	0.10	0.07	0.07	0.07
Performance characteristics				
Growth of companies (%)	44.1 (262.6)	32.3 * (2.39)	17.7 (0.9)	34.9 (215.5)
Growth of jobs (%)	57.3 (293.8)	49.8 * (629.0)	25.5 (124.3)	40.0 (248.0)
Change in property value (%)	124.0 (136.5)	130.4 (213.7)	123.0 (126.1)	118.1 (81.8)

Note: tests of the equality of the means: ** significant at the 1% level * significant at the 5% level.

The group of targeted (round 1 and round 2) sites consists of 905 sites (of which 446 are targeted in round 1) while there are 817 non-targeted sites in the total dataset of 1,722 industrial sites. From the mean values for site characteristics it can be noticed that on average, the problem sites are older. Almost 40% of the targeted sites is from the pre-1960s period, whereas the largest group of non-targeted sites is from the 1980s. Interestingly, 5% of targeted and declined sites was developed in the 1990s and is thus relatively young to already experience problems related to decline. Industrial sites dominated by manufacturing make up the largest group for both targeted and non-targeted sites. Mixed use is the second largest for both categories, although the group of mixed use sites represents 39% of the targeted and only 25% of non-targeted sites. Targeted sites are bigger, as measured by the total number of jobs and number of firms. The number of jobs per hectare however is higher for non-targeted sites. Average property values are 11% higher on non-targeted sites. The regional characteristics do not show large differences. The industrial sites in the dataset are quite evenly spread among the regions and areas of urbanisation distinguished. The mean values for the provincial dummies show the distribution of industrial sites over the Netherlands. Large, traditional industrialised provinces such as Noord Brabant and Gelderland house many industrial sites. The large cities Rotterdam and The Hague (Zuid Holland) and Amsterdam (Noord Holland) also have high shares of industrial sites.

The values of the performance characteristics in Table 4.1 indicate that targeted industrial sites show slower growth than non-targeted sites. Interestingly, property value change is higher for industrial sites that are targeted. Two further analyses of these differences in which the influence of the other variables is controlled for, are presented in the next section. In the first analysis it is expected that the results will show that a negative growth of the performance indicators will increase the chance of being targeted for regeneration. In the second, multinomial logistic regression analysis it is expected that all three of these variables will show a similar pattern: industrial sites that are targeted in the second round show negative results compared to the group of non-targeted sites. Industrial sites that are targeted for regeneration in the first round are expected to show more negative results compared to the industrial sites that are targeted in the second round.

4.4 RESULTS: DIFFERENCES BETWEEN TARGETED AND NON-TARGETED SITES

The results of the logistic regression analysis are presented in Table 4.2.⁴⁹ Non-targeted sites are the reference category, so the coefficients should be interpreted as the probability that an industrial site belongs to the group of targeted sites. Accessibility does not show a significant result. Residential land use does not influence the chance of being targeted, other than open space, which negatively influences the probability of being targeted. The categories of age show the expected results: older industrial sites are more likely to be targeted than younger ones, with industrial sites that were developed before the 1960s showing the largest coefficient as compared to all other age cohorts and the reference category 1990s. An expected result is the non-significant coefficients for types of industrial sites. Compared to the reference category of mixed-use industrial sites, no type of industrial site has a significantly larger probability of being targeted. One possible interpretation is that all industrial sites are evenly prone to targeting. The same can be concluded for size, as the coefficients for number of jobs and number of firms do not show significant results. The coefficients for environmental impact classes show that industrial sites that house potentially polluting or hazardous companies are more probable to be targeted. The variable for property values also shows the expected negative coefficient. Under regional characteristics, urbanisation rate does not show significant results. Scarcity unexpectedly shows a positive sign, indicating that the often-suggested relation between readily available land and decline does not exist for our dataset. An alternative explanation is that high levels of scarcity might lead to a larger policy effort to regenerate industrial sites in the existing built up space and thus targeting occurs more.

The results for the performance characteristics do not show any significant relations between these variables and the probability of being targeted for regeneration. The coefficients for all variables are insignificant, indicating that, having controlled for the other variables in the model, there appears to be no significant relation between economic performance and targeting. The second analysis is performed to find differences within the group of targeted industrial sites and compare these two groups with non-targeted sites. Hypothetically, and according to the theory laid out by Bartik (1994) among others, there are differences to be found for the performance indicators within the group of targeted sites as industrial sites targeted in round 1 are assessed as in need of regeneration before the sites targeted in round 2.

49 With all VIF scores below 5, multicollinearity does not appear to influence the results of the multivariate analyses performed.

Table 4.2

Results of the logistic regression. Probabilities for site characteristics, regional characteristics and performance characteristics on targeted sites. Reference category: non-targeted sites.

VARIABLES	COEFFICIENT	Z-VALUE
Site characteristics		
Accessibility	0.022	(1.86)
Land use residential (ha)	0.003	(0.60)
Land use open space (ha)	-0.015 **	(-3.53)
Age		
1980s	0.432 *	(1.93)
1970s	1.284 **	(5.73)
1960s	1.327 **	(5.85)
Pre 1960s	1.925 **	(8.57)
Type of industrial site		
Consumer services	-0.168	(-0.60)
Financial services	-0.433	(-1.60)
Logistics	0.029	(0.15)
Manufacturing	0.056	(0.41)
Miscellaneous	-0.762	(-1.92)
Number of jobs (x100)	-0.008	(-1.24)
Number of companies	0.003	(1.91)
Number of jobs per hectare (x100)	-0.057	(-1.17)
Environmental permit impact class		
Environmental impact class 4	0.382 *	(3.01)
Environmental impact class 5	0.675 *	(3.25)
Sea port	-0.616	(-1.40)
Property value per hectare (x1000)	-0.0004 *	(-2.86)
Regional characteristics		
Scarcity	4.782 *	(2.18)
Urbanisation rate		
Metropolitan agglomeration	0.005	(0.03)
City region	0.128	(0.83)
Performance characteristics		
Growth number of companies	-0.089	(-1.60)
Growth number of jobs	0.021	(1.28)
Change in property value	0.024	(0.57)
Constant	-5.758	(-2.80)
N	1,722	
Pseudo R2	0.145	
Log likelihood	-1019.21	

Note: results for provincial dummies are not reported for brevity.

** significant at the 1% level * significant at the 5% level.

Table 4.3 shows the results of the multinomial logistic regression analysis. Dividing the dataset into three categories does not change the overall pattern for most control variables. Other than expected, poor accessibility does not appear to be a reason to target industrial sites for regeneration. Round 1 industrial sites even show a positive coefficient for this variable. The coefficient for housing remains insignificant, while open space shows the expected negative sign for targeting in both rounds. Again, most age variables show the expected pattern, with only industrial sites developed in the 1980s showing non-significant results for the probability to be targeted in round 2 compared to industrial sites developed in the 1990s. A possible explanation for this is that sites in both these age bands belong to a similar 'generation' of industrial sites, developed in relatively the same style and with comparable characteristics (Louw et al., 2009; Olden, 2010). The presence of companies in the highest environmental impact class does not increase the probability to be targeted in round 2, but shows a significantly higher probability of being targeted in round 1. Overall, these results indicate that industrial sites that can house firms with a potentially large impact on the environment are more probable to be regenerated, as expected. Two possible explanations for the results found are the nuisance these types of companies cause to their surroundings, or the economic importance of these companies at their present location, leading to a willingness for policy makers to invest in their present location to be able to accommodate economically important firms that are hard to relocate. Size has limited influence on targeting, with only round 2 sites showing a small positive relation with the number of jobs.

The coefficient for property value per hectare shows a significant negative relation with the probability of being targeted in round 1. A low spatial quality, as represented by low property values, thus leads to a prioritisation of being targeted. For scarcity, a negative coefficient with the probability for being targeted was expected, as this means a higher level of scarcity leads to less decline and subsequently, less regeneration is needed. For round 2 targeted sites, the opposite, unexpected effect is found. It appears that on the longer run, scarcity leads to more attention for the regeneration of existing industrial sites. Urbanisation rates do not show significant results, indicating that regeneration occurs in both rural and urban municipalities alike.

Table 4.3

Results of the multinomial regression analysis. Probabilities for site characteristics, regional characteristics and performance characteristics on round 1 and round 2 targeted industrial sites. Reference category: non-targeted sites.

VARIABLES	ROUND 1 TARGETED INDUSTRIAL SITES		ROUND 2 TARGETED INDUSTRIAL SITES	
	coefficient	z-value	coefficient	z-value
Site characteristics				
Accessibility	0.035 *	(2.59)	0.018	(0.11)
Land use residential (ha)	-0.012	(-1.70)	0.012	(1.77)
Land use open space (ha)	-0.015 *	(-2.91)	-0.017 **	(-3.19)
Age				
1980s	0.678 *	(2.27)	0.156	(0.51)
1970s	1.240 **	(4.13)	1.326 **	(4.65)
1960s	1.428 **	(4.76)	1.243 **	(4.28)
Pre 1960s	1.983 **	(6.68)	1.873 **	(6.59)
Type of industrial site				
Consumer services	-0.332	(-1.66)	-0.158	(-0.47)
Financial services	-0.599	(-0.26)	-0.240	(-0.72)
Logistics	-0.062	(-0.14)	0.046	(0.19)
Manufacturing	-0.023	(-1.23)	0.082	(0.50)
Miscellaneous	-0.773	(-1.52)	-0.871	(-1.70)
Number of jobs (x100)	-0.002	(-0.33)	-0.023 *	(-2.37)
Number of companies	0.003	(1.81)	0.003	(1.46)
Number of jobs per hectare (x100)	-0.043	(-0.80)	-0.065	(-0.88)
Environmental impact class				
Environmental impact class 4	0.501 *	(3.17)	0.298 *	(1.94)
Environmental impact class 5	1.037 **	(4.29)	0.339	(1.33)
Sea port	-0.861	(-1.52)	-0.404	(-0.79)
Property value per hectare (x1000)	0.0005 *	(-2.46)	-0.0003	(-1.86)
Regional characteristics				
Scarcity	3.695	(1.91)	5.756 *	(2.10)
Urbanisation rate				
Metropolitan agglomeration	-0.138	(-0.68)	0.072	(0.38)
City region	0.130	(0.188)	0.114	(0.62)
Performance characteristics				
Growth number of companies	-0.113	(-1.42)	-0.068	(-1.02)
Growth number of jobs	-0.009	(-0.23)	0.028	(1.48)
Change in property value	0.051	(1.09)	-0.012	(-0.22)
Constant	-7.118		(-2.79)	
N	1,722			
Pseudo R2	0.172			
Log likelihood	-1506.273			

Note: results for provincial dummies are not reported for brevity.

** significant at the 1% level * significant at the 5% level.

When it comes to the performance characteristics there are no different results from the first analysis. None of the performance characteristics show significant results, indicating there are no differences between industrial sites targeted for regeneration in round 1, round 2 and non-targeted industrial sites for the change in the number of companies, jobs and industrial property values. Overall, there is hardly statistically significant evidence that industrial sites that are targeted for regeneration in either round 1 or 2 show slower growth on performance characteristics than industrial sites that are not targeted. Furthermore, the differences between round 1 and round 2 targeting sites are also limited. Industrial sites targeted in round 1 do not necessarily appear to be in more need of regeneration, as measured by the performance characteristics, than sites targeted in round 2 and even non-targeted sites.

4.5 CONCLUSIONS

The question whether the urban areas that are targeted for regeneration initiatives are actually the areas that are the most needy places has not been addressed much empirically in existing studies. Regeneration initiatives are often aimed at local economic development of blighted areas, but are the targeted areas indeed areas that suffer from decline? This paper set out to study the case of targeting rapidly declining industrial sites in the Netherlands to fill this void in existing literature. The results of the analyses performed in this paper provide insight into the characteristics of industrial sites that are targeted for regeneration initiatives as compared to sites that are not targeted. Furthermore, differences between sites that are targeted in two different rounds of regeneration programmes are studied in more detail. According to the justification that is used for regeneration initiatives, targeted industrial sites should be the ones that underperform in terms of economic performance. Economic performance is represented by three characteristics: growth of jobs, growth of number of companies and growth of property values. Theoretically, low values for the performance characteristics add to the probability of industrial sites to be targeted for regeneration. High values add to the probability of falling into the category of non-targeted industrial sites. Industrial sites targeted in round 1 are prioritised as these sites were subject to regeneration in the period 2011-2014. Sites targeted in round 2 are assessed as in need of regeneration only after this period and are therefore expected to economically outperform round 1 sites.

The results of the logistic regression show that there are no differences between targeted and non-targeted sites. Dividing into three categories does not change the pattern. Sites targeted for regeneration in round 1, round 2 and non-targeted sites do not show differences in economic performance. These results indicate that the economic performance of industrial sites has little relation with policy makers' decisions to target industrial sites for regeneration. Therefore industrial sites that are targeted for regeneration are not necessarily the industrial sites that are the ones in need of these programmes. While local economic development policy is aimed at targeting sites that are struggling with the negative effects of decline, in practice targeted sites do not underperform on three characteristics that represent economic performance. Of course the results should be interpreted with care. The regional dummies included in the analysis control for possible differences in interpretation of decline by policy makers that can influence the targeting of industrial sites and may thus cause noise in the interpretation of our results. Despite the fact that guidelines for targeting are generally shared among policy makers, there can still be differences between the policy makers' choices and this possibly influences the results of the empirical analysis. A possible alternative explanation for some of the results found therefore seems straightforward: strategic and political decision making.

A second alternative explanation is elaborated here. The results might indicate that industrial sites are targeted at exactly the right moment in time. Just before the industrial site is losing jobs and companies in numbers and the process of decline has led to disinvestments causing property to deteriorate and fall in value. In that case, policy makers might assess and target the right industrial sites and measuring the performance of industrial sites actually fails in recognising the right sites. From a policy perspective it seems appropriate to make investments before the problems that are related to decline have had a large influence on the industrial site. The investments to regenerate an already declined industrial site can be much larger and therefore less efficient. In fact, Ploegmakers and Beckers (2015) mention that municipal master plans for regenerating industrial sites often cite that one of the goals is to prevent that the sites will experience a downward spiral. However, one might wonder whether policy makers will be able to exactly identify this particular moment in time.

There are several directions for future investigation. In particular, adding political and strategic decision making into a large scale analysis as the one presented in this paper is an important, but challenging, avenue for future research. In addition, it would be interesting to further specify some of the variables used in this dataset. Type of industrial site does not show any significant results, although it is reasonable to expect differences in the

probability of being targeted for different types of industrial sites. A more narrow specification for types of industrial sites might improve interpretation of results. To conclude, our study shows that, for the Netherlands, it is at least doubtful that public money for the regeneration of industrial sites is always used for what it is meant for, namely targeting those industrial sites that are clearly underperforming in an economic sense compared to other sites.

5

PLANNING INTERVENTION AND BUSINESS DEVELOPMENT



Abstract

There has been a growing research interest in measuring the impact of planning and land use regulations on housing market outcomes, but parallel development of the evidence base for the industrial and business sector has yet to occur. This paper examines the impact of planning intervention on the amount of building investment activity taking place on sites for industrial and business development. Different types of planning intervention are incorporated in a model of industrial building investment. The model is estimated using data that cover a sample of industrial and business sites in the Netherlands. The results provide some evidence of the negative effects on new construction often associated with planning induced restrictions on the amount of available land. However, it appears that more proactive, targeted planning policies, designed to improve the physical environment of a site, have a more profound and positive impact on investment in both refurbishment and new construction.

Ploegmakers, H., Beckers, P., Van der Krabben, E., The impact of planning intervention on business development: Evidence from the Netherlands. Submitted to a peer reviewed journal.

5.1 INTRODUCTION

Planning systems introduce a range of policy initiatives and instruments in order to influence the level, location and spatial distribution of business activity. In doing so, the planning system in its various guises creates benefits as well as costs for firms. It has been argued that the greatest negative impact of planning on business development is through the restriction of land supply. First, supply restrictions will directly influence the level of economic activity by reducing the number of business premises that can be built in a particular location. Second, the resultant shortages of business space will increase the cost of space by pushing up the prices of land and property. Third, planning policies might force firms to move to sites that are less optimal from the point of view of operating costs or revenues (Henneberry et al., 2005; Cheshire et al., 2014). However, by correcting market failures the planning system also creates benefits for firms. It has long been recognised by policy-makers that direct public intervention is specifically required in regions or urban areas that are under-performing relative to others because business development would not

otherwise occur. Policies and strategies designed to regenerate these areas may include direct expenditure in infrastructure, the physical environment and the provision of commercial land and property.⁵⁰ These activities are seen as an important means to stimulate new investment and to encourage existing businesses to stay or even expand their activities (Ball, Lizieri, & MacGregor, 1998). Constraining the supply of greenfield land might further contribute to the regeneration of these areas by encouraging upgrading and redevelopment of ageing premises in these locations (see e.g. Brueckner, 2000; Barker, 2006).

Despite the potentially profound impact of the planning system on the commercial property market, there have been few attempts to explore this relationship. This paper attempts to address this lacuna and presents results from a novel micro dataset on permit activity at sites allocated for industrial and business uses in the Netherlands. Such sites accommodate nearly one-third of all jobs in the country (Knoben & Weterings, 2010). The empirical analysis examines the impact of a set of indicators of planning intervention, which reflect the main policy actions and initiatives deployed by (local) governments in order to influence industrial and business development. To do this, a theoretical model is introduced that combines conceptual frameworks developed in macroeconomic studies of investment in fixed capital and the location theory literature.

The work on this topic is motivated by its prominence in Dutch policy debates in recent years. Since the early nineties it has been suggested that over-restrictive planning policies might originate in insufficient land supply, which in turn might constrain economic development (see e.g. BCI and NEI, 1994). However, during the last decade many commentators have made the reverse argument by highlighting the beneficial outcomes of a more restrictive planning system (Council for Housing, Spatial Planning and the Environment, 2006; Gordijn et al., 2007; THB, 2008). Planning may prevent unrestricted sprawl of industrial and business areas and result in improvements to landscape and environmental quality. In addition, the cheap and plentiful supply of land serviced for industrial development may diminish the incentive for redevelopment and refurbishment of aging premises on existing sites, so restrictions on the supply of greenfield land might assist in reversing the process of decay in these areas. These investment patterns might be reinforced by more

50 Physical property-led projects no longer dominate British urban policy as in the 1980s (see Turok, 1992), but the provision of commercial property and infrastructure remains an important policy mechanism in urban regeneration schemes (Tyler et al., 2013). Authorities in the US increasingly rely on physical improvements of blighted urban areas, which are usually funded through tax-increment financing (TIF). The majority of TIF districts are designated in commercial and industrial areas (see Byrne, 2010; Lester, 2014).

proactive planning policies that fund physical improvements of these areas. There is, however, very limited evidence on the value of these costs and benefits of the planning system in the Netherlands.

This paper proceeds in the following way. The next section discusses the conceptual and measurement problems that have constrained previous evaluations of planning policies and how we attempt to address these limitations. The following section describes the empirical approach adopted in the analyses of the paper and sets out the econometric model. The paper then provides detailed descriptions of our dataset of building investment and the additional variables incorporated in the model. This dataset is used to estimate the model, the results of which are described in the next section. The final section concludes and identifies promising directions for future research.

5.2 EVALUATING THE IMPACT OF PLANNING ON PROPERTY MARKET OUTCOMES

There has been considerable academic debate on the extent to which planning policies restrict new construction and lead to higher property values. This debate has been mainly informed by results from empirical econometric models in the US literature (see Quigley and Rosenthal, 2005 for a review; and see Ihlanfeldt, 2007; Glaeser, Gottlieb, & Tobio, 2012 for more recent contributions), although recent years have witnessed a growing research interest in the impact of land use regulation and planning in the UK (Bramley, 2013). Nevertheless, there are at least three main limitations in the conceptualisation and measurement of planning policies that appear to have constrained the development of the required evidence base.

5.2.1 A LACK OF INFORMATION ON THE IMPACT OF PLANNING ON COMMERCIAL PROPERTY MARKETS

The first limitation of existing research is the nearly exclusive focus on the housing sector (Henneberry et al., 2005). While several studies have recently began to consider the relationship between the planning system and the retail and office sectors (Jackson & Watkins, 2007; Cheshire & Hilber, 2008; Cheshire et al., 2014), similar work addressing the impact of planning intervention on the industrial sector is still largely absent. One attempt has been made by Henneberry et al. (2005) who examine the impact of planning regulations on the office and retail sectors, but also consider their effects on the

industrial property market. The impact of restrictions on the supply of land might be particularly large for manufacturing and wholesale distribution because these activities tend to use more space than offices or retail (Nathan & Overman, 2011). It is therefore important to consider the impact of planning policies on the performance of the industrial property market.

This study explores the relationship between planning intervention and the performance of the commercial property market through an analysis at the level of individual sites for the development of industrial and business uses. Unlike much commercial property research it does not distinguish between the 'traditional' sectors of offices, shops and industrial property. This is primarily because the empirical analysis is conducted at the level of industrial sites. At this level the boundaries between these sectors become substantially blurred (Ball et al., 1998). Industrial land clearly is important for manufacturing and wholesale distribution, but activities like research and development, repair and maintenance and ancillary office activity have property and locational requirements that are often quite similar to those of contemporary manufacturing firms. As a consequence, these industries end up being located in the same 'big box' structures found on industrial sites. In addition, local land use plans often permit office development and out-of-town retailers on land allocated for industrial and business purposes. However, higher order office users are not normally located at these sites because they favour more prestigious buildings and different locations.

5.2.2 INSUFFICIENT ATTENTION FOR THE MICRO LEVEL OF SUPPLY

A second shortcoming is that, although the link between planning restrictions and prices appears well established, there have been few attempts to estimate the impact of planning on construction activity directly (Mayer & Somerville, 2000a; McLaughlin, 2012). The emphasis on the impact of planning upon prices is problematic since price increases may well be because of positive amenities that planning provides for local residents, rather than supply restrictions. In addition, the effects of restrictions on prices will be mediated through the responses of developers (Bramley, 2013; Hilber & Vermeulen, forthcoming), but the supply-side is (implicitly) rendered neutral in most studies. The body of empirical research that addresses this deficiency by directly measuring the impact of planning regulations on construction activity is growing (see Bramley, 1998; Mayer & Somerville, 2000a; Green et al., 2005; Quigley & Raphael, 2005; Glaeser & Ward, 2009; Saiz, 2010). These studies have employed metropolitan and city-level data to examine whether differences

in residential construction can be related to variation in restrictions imposed by planning regulations. As a result there is very little systematic evidence on the impact of planning constraints on spatial patterns of investment activity *within* the city. Such work could provide more evidence on the extent to which restrictions on greenfield development affect the level of development activity taking place in existing urban areas.

This limitation in the existing literature has been previously highlighted and various calls have been made to further advance the modelling of planning policies by exploring its effects at lower levels of spatial disaggregation, such as individual sites and neighbourhoods (Malpezzi, 1996; Bramley & Leishman, 2005; Meen & Nygaard, 2011 and particularly see Bramley and Kirk, 2005 in the context of business development). The research by Adams and Leishman (2009) makes a rare attempt in this direction and explores how the supply of greenfield land with outstanding planning permission affects the viability of development schemes on nearby brownfield areas. This study addresses this challenge by using data derived from building permit records that include exact street addresses. These addresses have been geocoded to precise geographic locations, which permits an empirical analysis at the level of individual sites.

5.2.3 INADEQUATE CONSIDERATION OF THE POTENTIALLY VARIED IMPACT OF DIFFERENT PLANNING INTERVENTIONS

Previous research has tended to reduce planning intervention merely to the restrictions imposed by land use plans and regulation on new development. Such a narrow conception ignores the heterogeneous nature of planning. Land use restrictions are only one form of planning intervention, alongside the supply of building land and new or improved infrastructure, fiscal or grant-based incentives, coordination measures and the provision of information to enhance market performance (Tiesdell & Allmendinger, 2005). As such, econometric models of market outcomes need to incorporate a broad range of indicators to measure planning intervention in order to capture more fully the range of, at times, contradictory actions and initiatives deployed by (local) planning authorities. Such models should capture not only the constraints imposed by planning regulations on new construction, but also the positive effects that some of the other initiatives are presumed to produce (Jackson & Watkins, 2005, 2007).

We seek to address this challenge by investigating the impact of various measures related to planning restrictiveness, in conjunction with indicators that establish the presence of initiatives that aim to regenerate rundown sites. We would expect regeneration programmes and policies, in particular, to have a positive relationship with investment activity because they are often specifically designed to encourage private sector investment. Accounting for these types of policy intervention could thus provide more insights into the effectiveness of the various initiatives and activities that governments have undertaken to regenerate deprived and rundown urban areas (Bramley & Leishman, 2005; Lester, 2014). The regeneration initiatives considered in this paper only put in place projects aimed at physical improvement and typically encompass road infrastructure improvements, investments in the public realm, relocation of undesired activities and in some instances the assembly and servicing of sites for redevelopment. These activities are normally undertaken by municipalities. Over the years, specific grant programmes from the national government and provinces were available to them to finance improvements of these sites.

5.3 MODEL DESCRIPTION

Much of the commercial property found on sites for industrial and business development in the Netherlands is owner occupied. An inventory by Stec Groep and NVB (2005) indicates that almost two thirds of all industrial and business space is owned directly by the users themselves. This suggests that most buildings on industrial sites have been built or commissioned by its occupants directly and that the share of properties built speculatively for rent is very small. Investment in these buildings can thus be best treated as an ‘investment’ decision of a firm (Wheaton & Torto, 1990). Most of the existing empirical work that has modelled aggregate construction activity in the industrial sector as a firm ‘investment’ decision is based upon capital stock adjustment models (Wheaton & Torto, 1990; Tsolacos, 1995). According to stock adjustment models investment takes place to close the gap between the current stock and a desired or optimal stock. In this paper it is assumed that the optimal capital stock reflects the firm’s goal to maximize profits. Profits are not observable, but we assume that they are influenced by the attributes of the site and its environment and by the characteristics of the firm (see Carlton, 1983; Bartik, 1985).

To test to which degree commercial building investment is affected by different types of planning intervention, models with the following basic specification are estimated:

$$I_{jt} = \gamma X_{jt} + \beta Y_{jt} + \theta Z_{jt} + \epsilon_{it}$$

here I_{jt} is the optimal level of private sector investment on site j in year t , X_{jt} is a vector of explanatory variables that capture the differential impact of planning policies, Y_{jt} denotes a vector of specific quality and locational attributes of the site, which can affect profits from both the cost and revenue sides, Z_{jt} is a vector of variables that reflect the characteristics of the firms located on the site and ϵ_{it} is the random error term. Three separate equations with distinctive dependent variables are estimated: total commercial building investment, investment in new construction and investment in refurbishment and improvement. This choice is motivated by the fact that planning policies might have differential impacts on distinct types of investment activity. The explanatory variables in all three models are the same. We include year fixed effects and municipal fixed effects that account for time-invariant, location-specific influences such as local market conditions. The nature of the dependent variables motivates two different empirical model specifications. The first is a tobit model, which we use to explain the level of expenditure on sites. We propose this model to deal with the censoring of the dependent variables: for many sites zero expenditure is reported in particular years. The second is a probit model, which only distinguishes between instances in which $Y_{jt} > 0$ and $I_{jt} = 0$. We use this model to explain the probability of investment activity on sites for industrial and business purposes.

5.4 DATA

5.4.1 DEPENDENT VARIABLE

Data on investment activity come from building permit records of individual municipalities. Building permit applicants have to report information on the location (street address), type and estimated costs of the proposed construction works. Although, a building permit is not required for all construction works, any substantial alteration will require a permit (Needham, 2007). As these data are not readily available, we have contacted municipalities to obtain annual extracts of their building permit records. The selection of municipalities was based on the national database of industrial sites (IBIS) and included all municipalities with at least one industrial site within their administrative boundaries in 2008. Information from building permits

issued in the period 2004–2008 has been assembled for a sample of 57 municipalities.⁵¹

Since we are interested in investment activity by firms located on industrial sites we have merged building permit records to the LISA (*Landelijk Informatiesysteem van Arbeidsplaatsen en Vestigingen*) database. LISA is a longitudinal dataset that contains detailed information on the number of jobs, industry type (NACE-codes) and the exact street address of all business establishments in the Netherlands. We matched LISA addresses with the building permit data using street names, numbers, number additions and zip codes.⁵² In order to identify whether establishments are inside or outside industrial sites included in IBIS we plotted business establishments on GIS maps of these sites.⁵³

The descriptions of construction activity provided by building permit applicants have been coded into several categories. The permit data were filtered through the use of this coding scheme. First, we have restricted our sample to commercial buildings.⁵⁴ Second, permits were discarded if they were issued for demolitions, construction work on structures other than buildings and construction work of a temporary nature or if the estimated construction costs were not recorded. Third, we have classified records into two broad categories of building investment: investment in new construction and investment in existing structures (such as modernization, remodelling, replacement and additions) respectively. The latter category is henceforth termed ‘refurbishment’. In the tobit model the dependent variable is the annual sum of expenditure per site in each of these two categories. We construct these variables by aggregating annual expenditure in the two categories from the address level to the industrial

51 The format of the data made available by the municipalities varied. Some municipalities provided extracts that covered all issued permits for a certain period, while others gave access to a subset of building permits issued for streets located on industrial sites. For other municipalities, research assistants traced back all relevant building permits pertaining to specific streets in the original records.

52 We have employed several procedures to ensure that address spelling was compatible, including manual adjustments to street names. We also performed three additional rounds of matching with different criteria that added a modest number of matches. Building permit information was either unavailable or inconsistent for quite a large number of streets. This may be due to the fact that no building permits have been submitted for these streets in the period of interest, but it might also be related to the procedures of data collection. These streets have therefore been dropped from the analysis.

53 We have geocoded the LISA addresses so that they could be mapped. The geocoding process is described in Appendix C of Beckers et al. (2012).

54 This category includes single and multitenant building types like production plants, industrial sheds, warehouses, offices, service stations, petrol stations, show rooms and other shops. We have preserved permits for structures that combine commercial and residential uses.

site level. We obtain a third dependent variable, total investment in commercial buildings, by summing expenditures across these two broad categories. All three dependent variables are in natural logarithms.⁵⁵ In the probit model, a dummy variable indicates whether the sites experienced any investment activity at all in the three dependent variables.

5.4.2 INDICATORS OF PLANNING INTERVENTION

We start our description of the study's explanatory variables with the variables that reflect planning interventions as they are central in this study. The first group of planning indicators relates to the extent to which local plans and regulations are restrictive for new industrial development. One of the central concerns in the literature that addresses the impact of planning regulations is how to measure planning restrictiveness (see Bramley, 1998; Gyourko, Saiz, & Summers, 2008). The indicators of planning restrictiveness used in this analysis are based on quantitative measures of land availability. This is for two reasons: one is their salience in policy debates and the second is that Bramley and Watkins (2014), who review measures of planning restrictiveness, conclude that the amount of land made available through the planning system is the preferred indicator of planning restraint.

We have derived a measure of land supply at the site level from the IBIS file, which registers the total amount of land available on each site for industrial and business uses in the Netherlands. The IBIS dataset is also used to calculate the annual amount of land that is readily available for development at the regional level. We use regions because the boundaries of these areas are reasonable proxies for localized business and industrial property market areas. More than 90% of all firms relocating do not consider any region other than the one in which they are located (Knoben & Weterings, 2010). The total land supply is divided by the average take-up of land over the period 1997-2008 to obtain the number of years supply assuming an average annual take-up. A survey by the Netherlands Environmental Assessment Agency (PBL, 2009a) has revealed that many municipalities use this figure to assess whether the actual amount of available land needs to be expanded. As a rule of thumb, the amount of land readily available should allow two to five years of average annual take-up.

In addition to our measures of planning restrictiveness we incorporate a variable that captures the presence of policies designed to improve the physical environment of the site. The data were derived from a survey among municipal officials which was largely administered in 2009. The municipalities

55 Construction works that do not require a building permit often involve minor alterations. Small building investments are therefore absent from our database. The smallest observed value for the dependent variable is 500 and we therefore impose $\ln(499)$ as the censoring limit.

that responded coincide with those for which building permit data is available.⁵⁶ The survey was used to collect information about the occurrence, beginning and ending date of regeneration initiatives for each site included in the IBIS dataset. The beginning date assigned to regenerated sites is the first year that projects were implemented and the ending date is the last year of project implementation. These data permit us to analyze the impact of the actual timing of funded projects on building investment. For this purpose, we have created a set of three dummy variables. The first variable is coded 1 for all years preceding the implementation of regeneration projects on the site, the second variable takes value 1 for all years that regeneration projects were implemented on the site and, finally, the third variable is coded 1 for all years subsequent to the completion of all regeneration projects on the site. The inclusion of the first dummy variable allows for comparing levels of building investment before and after the implementation of projects across all sites that have been targeted by regeneration. If an industrial site has not been regenerated, then all three of the above variables take value zero.

5.4.3 FIRM CHARACTERISTICS

The model controls for the characteristics of the firms located on the site, because we assume that expected profits and thus the optimal level of investment depends on the characteristics of the firm. We use the LISA dataset to obtain information about firm characteristics. We include the share of establishments in a specific industry to account for the fact that the profits firms expect to earn depend on sector-specific conditions and developments. We distinguish between five broad industry categories based on their NACE-codes: consumer services, financial services, logistics, manufacturing and the public sector. We also calculate the proportion of large firms since larger firms tend to exhibit inferior growth rates in terms of profits and employment as compared to their smaller counterparts (see e.g. Audretsch & Dohse, 2007). The coefficient of this variable is therefore expected to be negative.

To identify the presence of firms with a large environmental impact, a dummy variable is constructed, which takes value 1 if the site houses firms in one of the three classes with the greatest environmental impact in terms of noise, odour, dust and major industrial hazards according to the Association of

⁵⁶ One municipality was not able to provide the requested information about regeneration and we added this information by making use of municipal documents and the official website.

Table 5.1

Descriptive statistics

VARIABLE NAME	MEAN	STANDARD DEVIATION	MIN.	MAX.	DATA SOURCE
Dependent variables					
Total building investment (€ x 1000)	716.63	2,390.42	0.00	51,000.00	Building permit records
Refurbishment (€ x 1000)	234.36	952.01	0.00	31,000.00	Building permit records
New construction (€ x 1000)	482.72	2,073.55	0.00	50,200.00	Building permit records
Total building investment (dummy)	0.54	0.50	0.00	1.00	Building permit records
Refurbishment (dummy)	0.45	0.50	0.00	1.00	Building permit records
New construction (dummy)	0.30	0.46	0.00	1.00	Building permit records
Planning variables					
Land supply at site-level (hectares)	2.06	8.19	0.00	134.43	IBIS
Number of years supply	3.89	2.18	0.00	13.20	IBIS
Prior regeneration (dummy)	0.07	0.26	0.00	1.00	Own survey
During regeneration (dummy)	0.07	0.26	0.00	1.00	Own survey
Post regeneration (dummy)	0.04	0.20	0.00	1.00	Own survey
Firm characteristics					
Number of establishments	47.46	66.55	1.00	534.00	LISA
Share active in manufacturing (%)	30.68	21.91	0.00	100.00	LISA
Share active in financial services (%)	17.20	16.06	0.00	100.00	LISA
Share active in logistics (%)	24.08	18.42	0.00	100.00	LISA
Share active in public sector (%)	3.13	9.22	0.00	100.00	LISA
Share active in consumer services (%)	24.91	20.51	0.00	100.00	LISA
Share of large firms (%)	10.78	17.82	0.00	100.00	LISA
Environmental impact (dummy)	0.47	0.50	0.00	1.00	LISA and VNG
Site attributes					
2000 onwards (dummy)	0.07	0.26	0.00	1.00	Topographical maps
1990-1999 (dummy)	0.17	0.38	0.00	1.00	Topographical maps
1980-1989 (dummy)	0.16	0.36	0.00	1.00	Topographical maps
1970-1979 (dummy)	0.18	0.39	0.00	1.00	Topographical maps
1960-1969 (dummy)	0.18	0.38	0.00	1.00	Topographical maps
Before 1960 (dummy)	0.24	0.43	0.00	1.00	Topographical maps
Near motorway (dummy)	0.20	0.40	0.00	1.00	NWB
Travel time to motorway junction (minutes)	5.32	5.19	0.52	38.87	NAVTEQ
Surrounding land use: residential (hectares)	15.55	15.62	0.00	71.61	CBS
Surrounding land use: greenspace (hectares)	22.28	18.69	0.00	74.43	CBS

Notes: The number of observations is 2,664.

Dutch Municipalities (VNG, 2007).⁵⁷ In industrial areas, the restrictions imposed by environmental regulations will be less stringent than in other urban areas (PBL, 2009a). Industrial sites will therefore be more profitable locations for firms with a large environmental impact (Becker & Henderson, 2000). Furthermore, these firms will have fewer alternative sites available to them (Van Dijk & Pellenbarg, 2000). Therefore, we expect increased investment activity on sites where these type of firms are located. Finally, a firm count is established for each site because the overall probability that at least one of the firms performs investment activity will be higher on sites that house a large number of firms.

5.4.4 SITE ATTRIBUTES

We include a number of variables that measure the attributes of the site and its environment as these attributes are expected to influence profit opportunities and therefore investment activity. The first measure relates to the age of the site and is categorized into five age bands. This variable was constructed by visually inspecting historical maps for the period 1950-1990 to determine when sites have become occupied by industrial uses. For sites developed after the 1990s, the IBIS database was used to calculate the age. Age acts as a proxy for the physical characteristics of the site since the building type, site layout and overall design will be dependent upon the technologies and specifications at the time of development (Olden, 2010). Investment in refurbishment is likely to occur on older industrial sites that tend to accommodate older buildings, which are more likely to require replacement capital that makes up for obsolescence and physical deterioration. In contrast, most investment in new buildings will take place on newly developed sites as these will be more suitable for housing modern production operations and because overall design standards will be higher.

Second, we create two variables that define the location of the industrial site in relation to the motorway network. For the first one we average the shortest travel time (in minutes) along the road network to the nearest motorway junction for all firms located on a given site. The second one is a dummy variable that takes value 1 if the industrial site is intersected by a motorway (using a 100 metre buffer). Proximity to the motorway network will enhance firm profit opportunities rendering better access to markets and suppliers and will therefore encourage investment activity (Van Dijk & Pellenbarg, 2000; Holl, 2004a, 2004b). We include the second variable because a location close to a

57 Business activities are classified on the basis of their NACE-codes so we could merge this information to the LISA database. Some industry types are assigned multiple classes depending on the kind of activities carried out by the particular firm. We use the minimum class and our results are therefore likely to underestimate the overall impact of this variable.

motorway will not only provide accessibility advantages but also promotional advantages in terms of visibility from the road (Van Dijk & Pellenbarg, 2000).

Finally, two variables have been constructed that capture the potential influences of surrounding land uses. We distinguish between housing and greenspace, the latter being defined broadly to include farmland, forests, wetlands and other nature areas. The number of hectares within a 500 meter radius assigned to one of these two categories was averaged over all LISA firms on the site. Increased encroachment by residential areas will limit expansion possibilities for growing firms. In addition, these sites might become less profitable because environmental regulations require substantial investments in pollution abatement equipment. Finally, traffic congestion is likely to be higher in densely populated areas and this might even offset the advantages firms derive from locating in the vicinity of the motorway network (Van Dijk & Pellenbarg, 2000). From this, we expect a negative coefficient for the residential land cover variable. In contrast, we expect a positive relationship between investment activity and the land covered by greenspace in the vicinity of the site. Sites at the edge of cities tend to be less congested and provide more opportunities for expansion. In case of new construction, firms might also benefit from lower land prices in these areas. Table 5.1 provides some summary statistics on the variables used in the empirical work.

5.5 RESULTS

This section presents the results of the tobit and probit estimations for commercial building investment on industrial sites from 2004 to 2008. As noted above, the analysis is based on the estimation of three separate equations with distinctive dependent variables. Table 5.2 presents the estimates for total building investment and tables 5.3 and 5.4 present the results of the estimations with investment in refurbishment and new construction respectively as dependent variables. In all tables, the first two columns report the results of the probit estimation and the last two columns report the results of the tobit estimation. The degree of fit of the models is rather low. This is common for this type of micro-level modelling and reflects the presence of considerable noise and discontinuities in the annual data. Despite their low explanatory power, all models are highly significant overall and the signs of the independent variables are mainly as expected. The separate estimations for refurbishment and new construction show considerable variation in the effects of the independent variables, in line with the hypotheses formulated above. The relevance of distinguishing between different types of investment in empirical analyses is highlighted by these results.

Table 5.2

Estimation results for total commercial building investment activity

VARIABLES	PROBIT		TOBIT	
	Coefficient	Z-value	Coefficient	T-value
Planning variables				
Land supply at site-level	0.0054	1.240	0.0439	2.450 **
Number of years supply	0.0171	0.530	0.0568	0.550
Prior regeneration (dummy)	-0.1714	-1.020	0.2613	0.480
During regeneration (dummy)	0.2958	1.750 *	1.1854	2.680 ***
Post regeneration (dummy)	0.3082	1.460	0.9388	1.620
Firm characteristics				
Number of establishments	0.0201	8.880 ***	0.0238	7.560 ***
Share active in manufacturing	0.0027	1.380	0.0086	0.970
Share active in financial services	0.0007	0.250	0.0205	1.750*
Share active in logistics	-0.0007	-0.330	0.0019	0.200
Share active in public sector	-0.0030	-0.730	-0.0179	-0.920
Share of large firms	-0.0006	-0.270	-0.0169	-1.770 *
Environmental impact (dummy)	0.2089	2.580 ***	1.6938	5.330 ***
Site attributes				
1990-1999 (dummy)	-0.1271	-0.920	-0.7178	-1.200
1980-1989 (dummy)	-0.2400	-1.580	-1.0196	-1.590
1970-1979 (dummy)	-0.1653	-1.120	-0.6754	-1.050
1960-1969 (dummy)	-0.1794	-1.120	-0.6592	-0.970
Before 1960 (dummy)	-0.0876	-0.590	-0.9802	-1.510
Near motorway (dummy)	0.2017	1.780 *	0.8909	2.210 **
Travel time to motorway junction	0.0078	0.470	0.0245	0.360
Surrounding land use: residential	-0.0114	-3.430 ***	-0.0805	-5.870 ***
Surrounding land use: greenspace	-0.0077	-2.830 ***	-0.0505	-4.380 ***
Constant	-0.3606	-1.290	7.9493	7.300 ***
Number of obs.	2,664		2,664	
Pseudo R2	0.2920		0.1026	

Notes: All estimations include year and municipality fixed effects. Robust (clustered at the industrial site level) standard errors are reported. Significance levels are indicated by: * for 10 per cent, ** for 5 per cent and *** for 1 per cent.

The results demonstrate that the number of hectares available for business and industrial development on an industrial site have a positive effect on investment in new commercial buildings. Sites with a large amount of land available for development are more likely to experience new construction activity. Also, construction expenditures are likely to be higher. This variable is, however, only significant at the 5% level, which suggests that new construction is not primarily driven by land availability. This effect is stronger, but less significant, when the amount of land that is readily available on the site is used

rather than the overall amount that the local land use plan(s) allocates for the site. The consistently insignificant coefficients for refurbishment suggest that the available land supply on the site does not influence investment activity in existing premises, as we would expect.

It is particularly interesting to investigate the impact of the number of years supply (the measure of land supply in the local property market area) on refurbishment activity, because this relationship has prominently figured in current debates. It is widely believed that the abundant supply on new industrial sites takes away the incentive for firms to refurbish and redevelop their existing premises. The variable has a weak and statistically insignificant effect in both the tobit and probit model for refurbishment. The coefficients remain insignificant when we use an alternative indicator that expresses the amount of available land at the municipal level as a ratio of the stock of land on industrial sites already taken up by firms, a measure of the size of the local market. Our results therefore do not lend support to the proposition that there is a systematic relationship between land supply on surrounding (greenfield) sites and the level of refurbishment and redevelopment on existing sites. The variable also has an insignificant effect in the models for total investment and new construction. This latter finding is not entirely surprising given our level of analysis: patterns of new construction at individual sites will be mainly influenced by the land supply at the site itself rather than the overall land availability in a local market area.

As already explained, the model also looks at the impact of regeneration initiatives that fund physical improvements of the site, which are expected to have a positive effect on private sector investment activity. The results consistently demonstrate that building investment is more likely to take place, and that expenditures are likely to be higher, in the period that regeneration projects are being implemented on the site, when compared to sites that are not subject to regeneration and when compared to sites prior to the implementation of projects. Interestingly, this effect largely disappears again when all projects have been completed on the site as evidenced by the insignificant coefficients for most post-regeneration dummies. The post-regeneration variables are only significant and positive for levels of new construction, which might be explained by the fact that it takes more time to conceive a scheme for a new construction project. The findings thus suggest that physical regeneration initiatives may act as a catalyst to private sector investment, and that it is the actual timing of publicly funded projects that stimulates investment by firms in their own premises.

Table 5.3

Estimation results for refurbishment activity in commercial buildings

VARIABLES	PROBIT		TOBIT	
	Coefficient	Z-value	Coefficient	T-value
Planning variables				
Land supply at site-level	0.0008	0.200	0.0139	0.820
Number of years supply	0.0165	0.490	0.0472	0.410
Prior regeneration (dummy)	-0.1405	-0.930	0.1467	0.270
During regeneration (dummy)	0.4139	2.740 ***	1.1733	2.660 ***
Post regeneration (dummy)	0.2314	1.170	0.3212	0.560
Firm characteristics				
Number of establishments	0.0162	9.940 ***	0.0259	8.670 ***
Share active in manufacturing	0.0035	1.700 *	0.0128	1.400
Share active in financial services	0.0020	0.780	0.0178	1.640
Share active in logistics	0.0004	0.200	0.0067	0.680
Share active in public sector	-0.0021	-0.500	-0.0114	-0.600
Share of large firms	-0.0020	-1.050	-0.0186	-2.130 **
Environmental impact (dummy)	0.2005	2.560 **	1.5179	4.910 ***
Site attributes				
1990-1999 (dummy)	0.2528	2.020 **	1.0213	1.880 *
1980-1989 (dummy)	0.1192	0.900	1.0434	1.830 *
1970-1979 (dummy)	0.2384	1.740 *	1.4805	2.450 **
1960-1969 (dummy)	0.3089	2.150 **	1.6118	2.600 ***
Before 1960 (dummy)	0.3157	2.390 **	1.3379	2.330 **
Near motorway (dummy)	0.1077	0.970	0.5804	1.450
Travel time to motorway junction	0.0045	0.290	0.0157	0.240
Surrounding land use: residential	-0.0106	-3.240 ***	-0.0724	-5.340 ***
Surrounding land use: greenspace	-0.0108	-3.950 ***	-0.0629	-5.590 ***
Constant	-1.0625	-3.790 ***	3.9628	3.640 ***
Number of obs.	2,664		2,664	
Pseudo R2	0.2958		0.1155	

Notes: All estimations include year and municipality fixed effects. Robust (clustered at the industrial site level) standard errors are reported. Significance levels are indicated by: * for 10 per cent, ** for 5 per cent and *** for 1 per cent.

We now turn to consider the impact of the variables that are not related to planning interventions. As expected, the number of firms located on an industrial site is a strong positive and significant predictor of investment activity in both the tobit and the probit regressions. Investment will also be higher on sites that accommodate firms with a large environmental impact, although this effect becomes insignificant when we use the proportion of firms with a large

environmental impact. This is probably due to the specific qualities of these sites, which might also affect profit opportunities for other firms. The coefficient of the share of large firms on the site is only significant in the tobit models, which implies that sites with a high proportion of large firms experience lower levels of building investment when it does occur. Finally, none of the variables that control for the sector shares on the site was found to be statistically significant at the 5% level.

Many of the age band variables are significant in both the tobit and probit estimations for refurbishment, when compared to the base age 2000 onwards. However, the magnitude and significance of the coefficients does not support the contention that refurbishment activity progressively increases with older age bands. This would be expected if it were to occur to make up for physical depreciation of older structures. Perhaps it is an illustration of the fact that commercial buildings reach the end of their functional or economic life span well before they reach the end of their physical lives (Dunse & Jones, 2005). All the age band variables exhibit a consistently negative and highly significant effect on new construction. Sites that have been developed prior to 2000 are less likely to experience extensive new construction activity, attesting to a preference amongst firms for new locations. As our age bands act as proxies for the physical quality of the site, this suggests that new construction is driven mainly by the quality of the site.

The presence of a motorway has a significant and positive effect in both estimations for new construction. This suggests that firms have a tendency to locate close to the motorway network. In contrast, this variable has an insignificant effect on both the likelihood and level of expenditure in refurbishment, which implies that it does not affect investment activity at the current location. The travel time to the nearest motorway junction, which was expected to have a negative coefficient, is insignificant in all of the models. A possible explanation is that the travel time to the nearest motorway junction only matters to firms up to a maximum point. As expected, increasing encroachment by residential areas is a strong deterrent to firm investment: the negative coefficients for this variable indicate that the likelihood and level of expenditure decrease with an increasing amount of land taken up by residential uses in the vicinity of a site. The negative coefficients for the amount of greenspace in both the tobit and probit models are rather unexpected. Interestingly, this negative relationship is insignificant for new construction, where we would expect a more pronounced positive effect. Taken together, the results for the variables that define the surrounding area of the site suggest that firms, when deciding to construct a new building, favour sites at or near the edge of cities over more peripheral locations.

Table 5.4

Estimation results for new construction of commercial buildings

VARIABLES	PROBIT		TOBIT	
	Coefficient	Z-value	Coefficient	T-value
Planning variables				
Land supply at site-level	0.0116	2.280 **	0.0816	2.520 **
Number of years supply	-0.0201	-0.590	-0.0993	-0.490
Prior regeneration (dummy)	0.0648	0.480	0.7671	0.880
During regeneration (dummy)	0.4471	3.260 ***	2.6254	3.410 ***
Post regeneration (dummy)	0.6312	3.730 ***	3.4924	3.710 ***
Firm characteristics				
Number of establishments	0.0065	7.130 ***	0.0290	6.780 ***
Share active in manufacturing	0.0024	1.230	0.0158	1.210
Share active in financial services	0.0021	0.700	0.0259	1.300
Share active in logistics	-0.0012	-0.520	-0.0040	-0.260
Share active in public sector	-0.0006	-0.130	-0.0090	-0.300
Share of large firms	-0.0038	-1.770 *	-0.0296	-2.020 **
Environmental impact (dummy)	0.2507	3.160 ***	2.0575	4.000 ***
Site attributes				
1990-1999 (dummy)	-0.4493	-2.870 ***	-2.8492	-2.860 ***
1980-1989 (dummy)	-0.5735	-3.320 ***	-3.9875	-3.670 ***
1970-1979 (dummy)	-0.4447	-2.700 ***	-3.2429	-3.120 ***
1960-1969 (dummy)	-0.3876	-2.240 **	-2.8240	-2.570 **
Before 1960 (dummy)	-0.5884	-3.430 ***	-4.0777	-3.760 ***
Near motorway (dummy)	0.2156	2.020 **	1.5427	2.350 **
Travel time to motorway junction	0.0084	0.470	0.0375	0.330
Surrounding land use: residential	-0.0155	-4.460 ***	-0.1212	-5.330 ***
Surrounding land use: greenspace	-0.0032	-1.090	-0.0302	-1.550
Constant	-0.3769	-1.340 ***	4.8708	2.680 ***
Number of obs.	2,664		2,664	
Pseudo R2	0.2284		0.1012	

Notes: All estimations include year and municipality fixed effects. Robust (clustered at the industrial site level) standard errors are reported. Significance levels are indicated by: * for 10 per cent, ** for 5 per cent and *** for 1 per cent.

5.6 CONCLUDING REMARKS

While there is a growing body of empirical studies that investigate the impact of planning policies on housing market outcomes, parallel development of the evidence base for the industrial and business sector has yet to occur. In this paper we explicitly examine the relationship between planning intervention and building investment on sites for industrial and business development. We use two unique datasets: the first contains information on individual building permits and the second dataset consists of a range of indicators that capture different dimensions of planning intervention. As such, the aim is to address two further limitations of existing research, namely insufficient attention for the micro level of supply and inadequate consideration of the potentially varied impact of different planning interventions on land and property markets.

Our empirical analysis provides some evidence of the perceived negative effects of planning restrictions on investment in new commercial buildings. New construction activity is affected by the amount of land which is available for industrial and business development on a site, although this influence appears rather weak. This result is broadly consistent with the findings in a more aggregated UK analysis, in which Henneberry et al. (2005) show that the supply of business space decreases when the local planning regime becomes tighter. Our findings are also consistent with the results of Bramley and Kirk (2005) from an analysis at the level of postcode districts, who find that the amount of land available for industrial and business development has a positive but marginal impact on actual land take-up. Our results also support their proposition that new construction activity is not predominantly land-supply driven, but mainly influenced by locational and quality attributes of the site. This largely confirms the widespread impression in the Netherlands of a situation of excess supply of industrial and business land relative to take-up. Local authorities, keen to promote local economic development, seem to have taken sufficient action to ensure that land availability is not a major constraint to new development.

The overall amount of land which is available in the local market area, as measured in terms of the number of years supply, does not appear to be influencing refurbishment and redevelopment activity. It thus seems that low levels of (greenfield) land supply will not assist in reversing the processes of decay of older industrial areas. It should be noted that this does not necessarily mean that such a relationship does not exist; it may also reflect that land supplies are generally more than adequate, although our preferred measure of overall land availability shows considerable variation across different regions.

The findings suggest that proactive, targeted planning interventions have a more profound and positive impact on investment. Policy-induced improvements to the physical environment will stimulate investment in both new construction and refurbishment. Jackson and Watkins (2007) come to similar conclusions on the basis of their examination of the impact of proactive planning policies on the performance of the retail property market. Our results differ from those of Lester (2014), who finds that the incidence and timing of TIF-funded physical improvements does not have a significant effect on overall commercial building permit activity. There are several explanations for these contradictory findings. One is that reliance on aggregated data of building investment masks variations in the impact on different types of investment. We observe the strongest and most significant effects in the separate estimations for investment in refurbishment and new construction. Another explanation is that physical regeneration projects have a differential impact by the purposes of the projects and the type of the area that is targeted. Whereas Lester does not discriminate between different types of regeneration projects or urban areas, this paper considers initiatives that fund physical regeneration projects in industrial and business areas, which have a clear focus on local economic development.

The findings have implications for planning policies for industrial and business development, notably those that seek to promote investment on rundown and deprived business sites. It has been argued that for regeneration policies to be successful an appropriate mixture is needed that combines restrictions on the release of land on greenfield sites with targeted, more proactive planning policies, designed to improve the physical environment in certain areas. Our results, however, suggest that at least in the Netherlands policy makers should primarily consider funding physical improvement projects as a means to encourage private investment on rundown sites for industrial and business uses.

Although the empirical findings do yield some interesting insights into the impact of planning intervention, there remains considerable scope for future research. In particular, further work should seek to establish a longer time series of data as our analysis only covers the period 2004-2008. In addition, this study does not cover all industrial sites in the Netherlands, although our data come from a fairly representative sample of Dutch municipalities that reflect a range of supply and demand conditions. Similar work should be undertaken for other urban areas and property markets. Finally, we have not formally addressed the issue of endogeneity with regard to our indicators that measure planning intervention. The decision to regenerate an industrial site will be non-random and related to the characteristics of the site (as shown

by Ploegmakers & Beckers, 2015). Although we include a rich set of variables that might affect both the level of building investment and the incidence of regeneration activity, it is therefore likely that our results underestimate the positive effects of regeneration initiatives because these policies will generally target underperforming sites. It has been suggested that restrictions imposed by planning policies may also be endogenously determined. This has been particularly argued for more clearly endogenous variables like the average approval time and refusal rates (Malpezzi, 1996; Bramley & Watkins, 2014; Hilber & Vermeulen, forthcoming), but this may also hold true for the amount of land that is released by the planning system.

6 EVALUATING URBAN REGENERATION



Abstract

Despite the widespread use of physical improvements as a strategy to regenerate deprived and rundown urban areas, there is only limited evidence on the precise impact of these kinds of regeneration activities. A number of conceptual and methodological problems that impinge on all evaluations of regeneration policies have constrained the required evidence base. This paper evaluates the impact of publicly funded physical improvements of rundown industrial sites in the Netherlands and seeks to address several of these challenges; namely, selecting appropriate comparison areas, attributing change to specific interventions, access to small-scale, longitudinal data and selecting outcomes congruent with policy goals and rationales. Pooled data from various sources provide us with information on regeneration initiatives and other site characteristics for more than half of all sites in the country. Propensity score matching enables us to systematically compare economic outcomes related to regeneration policy goals between sites that have been subjected to regeneration and those that have not. The results of this study suggest that physical regeneration of industrial sites has a negligible effect on economic outcomes that are related to the most commonly articulated policy goals: the increase of employment, of firm numbers, of property values and of the intensity of land use on these sites. These findings add to a small but growing body of work that investigates the economic impact of regeneration programmes that fund physical investments on commercial and industrial areas.

Ploegmakers, H., & Beckers, P. (2015). Evaluating urban regeneration: An assessment of the effectiveness of physical regeneration initiatives on run-down industrial sites in the Netherlands. Urban Studies, 52(12), 2151–2169.

6.1 INTRODUCTION

Physical improvements are one of the principal means by which governments attempt to regenerate deprived and rundown urban areas in many countries. In the UK, a very large share of regeneration expenditure has been allocated to physical projects over the years (see Rhodes et al., 2005; Tyler et al., 2013). Authorities in the US increasingly rely on physical improvements of blighted urban areas as well, which are usually financed through tax-increment revenues (Wachter, Gillen, & Brown, 2007; Squires & Lord, 2012). Physical regeneration initiatives typically encompass infrastructure investments such as new roads and public transport, public realm

improvements (streetscapes, lighting, landscaping), the demolition of obsolete buildings and the provision of building land or properties and refurbishment of existing buildings.

Despite the extensive use of physical investments in urban regeneration, there is little evidence available on the precise impact of these kinds of activities (Wachter et al., 2007; Tyler et al., 2010; Schulze Bäing & Wong, 2012). The lack of a sound evidence base is a common concern in the academic literature addressing the impact of the various regeneration initiatives that governments have deployed over time. It has been noted in relation to holistic, all-purpose regeneration programmes (Rhodes et al., 2005; Gutiérrez Romero, 2009; Lawless, Foden, Wilson, & Beatty, 2010) and more specific initiatives like brownfield policies that promote redevelopment of contaminated and derelict sites in the US (see De Sousa, 2005; De Sousa, Wu, & Westphal, 2009; Hula & Bromley-Trujillo, 2010). A number of conceptual and methodological difficulties have constrained the development of the required evidence base. These challenges include selecting appropriate comparison areas to address the counterfactual issue, attributing change to specific regeneration interventions, access to small-scale data that allow comparisons over time and selecting outcomes congruent with policy goals and rationales (Robson et al., 1994; Rhodes et al., 2005; Neumark & Kolko, 2010).

This paper evaluates the impact of publicly funded physical improvements of rundown industrial sites in the Netherlands and seeks to address many of the challenges that have constrained previous evaluations. The findings of this research are particularly relevant to the international debate about the effectiveness of policies and programmes that fund physical improvements on commercial and industrial areas. Regeneration of derelict and rundown industrial sites is typically discussed in terms of brownfield redevelopment. The industrial sites that are subjected to regeneration activities in the Netherlands differ from brownfield sites in the sense that the area is still in use and not necessarily contaminated (as opposed to brownfields in the US) and in the sense that the interventions being evaluated are not aimed at re-using the site for residential or other uses (as in Western Europe) (see Adams et al., 2010; Schulze Bäing & Wong, 2012).⁵⁸ It should be emphasised, however, that initiatives designed to regenerate rundown and deprived industrial areas in other countries are not necessarily confined to re-use of brownfield sites. Tyler et al. (2013) estimate that by the end of the last decade, improvements to industrial and commercial property and infrastructure accounted for over 11% of

58 While strategies are also designed and implemented to re-use industrial sites, or parts of the site, for other purposes, this paper examines areas that have been regenerated without its industrial land use being changed.

total regeneration expenditure in the UK. In the US, the physical improvements associated with tax increment financing (TIF) are often focused at areas that remain zoned for industrial and commercial purposes throughout the entire life span of the TIF designation.⁵⁹

This paper is organised as follows. In the next section we highlight the conceptual and methodological problems inherent to evaluations of urban regeneration policies and programmes and how we attempt to improve on these limitations in the present study. The section that follows identifies the goals and rationale underlying regeneration policies for industrial sites in the Netherlands. The paper then introduces the methodology and data that are used to conduct the impact evaluation, after which the results are presented. The final section contains the concluding remarks.

6.2 EVALUATING URBAN REGENERATION

There is a sizeable literature that points out the conceptual and methodological problems that constrain impact evaluations of urban regeneration initiatives (see e.g. Robson et al., 1994; Robson, 2004; Rhodes et al., 2005; O'Reilly, 2007; Lawless et al., 2010; Neumark & Kolko, 2010; Tyler et al., 2013). The first difficulty relates to the critical issue of establishing the counterfactual or measuring deadweight: what would have happened if the policy or programme did not exist? The counterfactual problem is typically addressed by comparing areas that are subject to a certain policy (the 'treatment' group) with comparison groups of areas that are not targeted by the policy or programme. It is crucial that the comparison group consists of areas that have similar conditions but are not subject to the policy. A variety of statistical approaches have been proposed for this purpose (see e.g. Bartik, 2004; Neumark & Kolko, 2010). In this analysis, industrial sites that were targeted by regeneration policies are compared to sites that were not subject to these policies using a propensity score matching methodology. This methodology will be explained in more detail below.

The second problem is to disentangle the effects of various interventions that form part of often complex regeneration strategies. These interventions include physical improvements, business development incentives, training and education programmes, environmental and planning regulations, health improvement services and crime reduction activities. The possibility that some

59 For example, Byrne (2010) shows that in the state of Illinois over 40% of the adopted TIFs are established for commercial development and that industrial areas account for 10% of the total designations.

interventions can have spill-over effects on the others further complicates this problem. The initiatives being evaluated in this paper only put in place projects aimed at physical improvement. Furthermore, industrial sites that are subjected to physical regeneration are not affected by other area-based initiatives. This enables us to attribute observed changes to a particular set of regeneration interventions. In addition, our survey of regeneration activity permits us to account for variations in the effects of different types of physical improvement projects. Surely, non-spatial policies including those that provide services or financial support to selected firms will affect outcomes of some firms on the sites concerned. We do, however, have little reason to believe that their impact varies systematically between sites depending on the characteristics of the latter.

A third major difficulty is the need to dispose over small-area data that enable comparisons over time as regeneration policies are generally focused at relatively small geographical areas. These kinds of data often are not readily available. This challenge is addressed by combining longitudinal data at the level of individual firms and properties with GIS maps of industrial sites. This combination of data makes it possible to isolate policy impacts to the precise area that has been targeted by physical regeneration and to track changes over time.

The fourth difficulty is that outcome measures have to be in line with the goals and the rationale on which the policy is based. Relevant policy documents were reviewed to identify the principal goals and objectives associated with physical regeneration. For this purpose, goal and vision statements were coded into several categories. The frequency of these categories was subsequently counted. These policy documents were also studied to explicate the underlying assumptions and expectations about how physical investments are to bring about the intended effects. The first step was to identify what problems regeneration initiatives were expected to address. The cause-and-effect sequence that was presumed to connect policy activities with the expected outcomes was spelled out subsequently. The evaluation literature has long stressed the importance of producing such accounts as a basis for interpreting evaluation results. Several synonyms are used to describe these conceptualisations, including programme theory (Chen, 1990), theory of change (Pawson & Tilley, 1997; Weiss, 1997) and policy theory (Hoogerwerf, 1990).

An important limitation of impact evaluations that has concerned the general evaluation literature, and work that assesses the effectiveness of urban regeneration specifically (see Lawless et al., 2010), is that they yield little information about how the policy or programme under consideration can be improved. While these evaluations often provide a reliable estimate of the

impact of a policy or programme, they have little to say about why or how the policy works or fails to work. For that reason, they are frequently referred to as black box evaluations (see Chen, 1990; Bartik, 2004). As the primary interest of this paper lies in determining whether regeneration policies have produced the intended effects, we do not explicitly address this limitation. It should be noted, however, that one of the main reasons for interest in programme theories is that they assist in explaining whether the policy fails to produce an impact because it was not implemented as intended or because the theory underlying the policy was misplaced.

6.3 REGENERATION POLICIES FOR RUNDOWN INDUSTRIAL SITES IN THE NETHERLANDS

The majority of regeneration initiatives on industrial sites are undertaken by municipalities and typical interventions include infrastructure improvements, investments in the public realm, relocation of undesired activities and the acquisition and demolition of obsolete properties and provision of building land in order to promote redevelopment. Municipalities can make use of grant programmes from the national government⁶⁰ to finance these interventions. At the provincial level, grant programmes are available as well. These funding schemes range from broad urban regeneration programmes to grant funds that are specially designed to promote physical regeneration of industrial sites. In case of contamination, funding for soil remediation can be obtained from specific grant programmes. Grant funding is usually matched by municipalities and in some instances they even finance regeneration without reliance on grants.

For the purpose of this paper, we are interested in the impact of all regeneration activities undertaken by municipalities, regardless of whether these initiatives are financed by any national or provincial grant programme. Nevertheless, our study of policy documents is restricted to master plans that were submitted by municipalities in order to qualify for a specific grant programme by the Ministry of Economic Affairs. This was the so-called Topper programme explicitly designed to encourage regeneration of industrial sites. Some 34 master plans published between September 2002 and March 2008 were identified, which covered a total of 60 industrial sites. The reason behind this choice was that documents delineating policy goals and rationales – referred to

⁶⁰ Grants are not targeted towards private sector actors, because they would provide an unfair competitive advantage according to European Commission State Aid regulations (EZ, 2004).

as master plans – are available for all regeneration initiatives designated by this programme as this was a formal requirement to qualify for funding.

It appears that the goals articulated in the master plans for the Topper programme are generalisable across other regeneration initiatives since they were among the most commonly cited benefits by municipal interviewees in several previous studies (see RIGO, 2000; Berenschot, 2004). Schemes that qualify for the grant programme do, however, differ from other regeneration initiatives in one notable way. Whereas the majority of regeneration initiatives do not involve redevelopment projects (see Olden, 2010, and the section that presents the empirical results), the focus of plans financed by the Topper programme is more heavily on acquisition and demolition of existing buildings, alongside infrastructure and public realm improvements.

What follows from the master plans is that regeneration initiatives are to tackle a range of problems that are primarily related to the state of the physical environment on the site, including obsolete and deteriorated properties, underused land, dilapidated public spaces and outmoded infrastructure. Problems frequently identified in other areas encompass high crime levels and exposure to contamination (see Table 6.1). The underlying rationale is that these problems act as a constraint upon the firms operating on the site. As such, municipalities consider physical regeneration primarily as a means to promote local economic development. While the master plans also emphasise the contribution of physical regeneration to broader, notably environmental goals, Table 6.1 shows that the most frequently expressed goals relate to the attraction or retention of firms and job creation. Policy statements that emphasise improvements to the business climate for existing and new firms are also subsumed under the aim of attracting or retaining firms.

The underlying view of the municipal officials responsible for the strategies outlined in the master plans is that investments in the public realm are important for enhancing the appreciation by existing firms of their environment (aesthetic quality, amenities), but also to attract new businesses to the site. This logic also applies to investments in roads and public transport, which are supposed to result in productivity gains by reducing transportation costs. In addition, municipalities assume that they can encourage the take-up of vacant and underused sites by acquiring and servicing the land themselves and then selling it to interested parties who will arrange the construction of new industrial property. This facilitates new floor space, which is believed to create jobs by accommodating new firms or allowing existing firms to expand. More efficient use of land is frequently articulated as an end in itself since it allegedly reduces demand for sites on greenfield land. Redevelopment measures

will probably induce more churning of economic activity – arrival of new firms, expansion and closing of existing firms – compared to investments in the public realm. Nonetheless, municipalities hold the view that the quality of the public realm needs to be improved so that existing firms wish to stay and new firms are to be attracted as the following passage demonstrates: ‘...in order to create an attractive business environment for existing and new entrepreneurs it is of great importance that the public realm is upgraded’ (Municipality of Dordrecht, 2006, p. 14; translation by authors). Finally, municipalities believe that the benefits associated with enhanced aesthetic quality and amenities will be revealed in rising property values (an uplift of property values was articulated several times as an explicit policy concern).

Table 6.1

Commonly cited goals and problems in municipal master plans for regeneration initiatives

GOALS	NUMBER OF TIMES MENTIONED IN DOCUMENTS
Attraction and retention of firms	57
More efficient land use	54
Improving quality of public spaces and buildings	39
Job creation	36
Sustainable development	37
Changing industrial composition	35
Environmental protection	26
PROBLEMS	
Quality of privately owned spaces (deteriorated, obsolete buildings)	44
Quality of green spaces (rundown, decayed)	39
Contamination (suspected)	32
Quality of roads and pavements (outmoded, decayed)	30
Poor accessibility by road (congestion)	27
Vacant buildings	25
Underused and vacant land	23
High crime rates	23
Parking problems	22
Nuisance by/to surrounding area	22
Poor accessibility by bus	19

The impact of regeneration will be measured on total employment and the total number of firms since these measures reflect two of the most commonly stated goals. To analyse whether the impact of regeneration is concentrated in a specific industry, a distinction will also be made between employment and firms in specific industries. Secondly, the impact of regeneration on the number of hectares occupied by firms and the employment-to-land ratio (i.e. the number of workplaces per hectare) will be analysed to find out whether regeneration has resulted in more efficient use of land on the site. Finally, the effect of regeneration on commercial property values is considered.

The examination of master plans provides some tentative suggestions why regeneration policies might fail to produce the intended outcomes. First, it seems that it is not always the case that the most needy places are targeted by regeneration. This is aptly illustrated by the following quote outlining the motives of the municipality of Tilburg to submit an application for three industrial sites:

Discussions with firms and municipal officers and on-site analysis reveal that these three industrial sites perform well on average, which does not imply that nothing has to be done in the short-term. The sites are functional and as a rule the spatial quality is satisfactory. (...) This master plan therefore is not about solving pressing problems, but rather about exploiting opportunities. (2008, p. 8; translation by authors)

Secondly, the analysis of master plans highlights the multiplicity and diversity of goals articulated by municipalities. These goals might be partially conflicting and a trade-off is therefore likely to exist between the achievement of the various goals. Furthermore, critical reviews of the core assumptions and expectations embodied in regeneration policies and programmes, notably in the context of neighbourhood renewal, have raised serious doubts about the veracity of the assumption that physical improvements can bring about the intended economic and social benefits as they are not directly related to these issues (see Andersson & Musterd, 2005; Van Gent, Musterd, & Ostendorf, 2009).

6.4 PROPENSITY SCORE MATCHING

6.4.1 INTRODUCTION

The propensity score matching approach to evaluation has been developed by Rosenbaum and Rubin (1983, 1984) for data that are non-random and non-experimental in nature (for applications to area-based regeneration

initiatives see Bondonio & Greenbaum, 2007; Gutiérrez Romero, 2009; Smith, 2009). The propensity score approach involves two steps. In the first step, the conditional probability of an industrial site being targeted by regeneration is estimated as a function of a variety of observed pre-intervention characteristics, referred to as the propensity score. By estimating propensity scores, systematic differences between targeted and non-targeted sites that might affect the outcome variables are controlled for by matching industrial sites that are as similar as possible in their estimated propensity score.

In the second step, targeted sites are assigned to control sites on the basis of their propensity scores. Different matching techniques can be used to match regeneration sites to non-regeneration sites. These techniques differ in the way weights for the matching are calculated. In this study, regeneration sites have been matched to areas with the closest propensity scores. To avoid poor matches (i.e. large differences between regenerated sites and their closest non-regenerated neighbour) a threshold on the maximum propensity score distance, the radius, was imposed (radius matching). Matching occurs among all propensity scores within a radius of 0.01. A single site may be matched more than once to a regeneration site. The sample is narrowed to the region of common support: regeneration sites with a propensity score higher than the maximum or less than the minimum of the control observations were discarded.

An advantage of matching with propensity scores is that it reduces the challenge of matching on multiple characteristics. Of course, observable characteristics could also be included directly in a regression equation that predicts the outcome variables of interest. However, in order to do this the functional form by which the observed characteristics affect economic outcomes has to be known. Since this paper sets out to measure the impact of regeneration on several outcome variables this precondition is not attainable in practice.

6.4.2 THE PROBABILITY OF PHYSICAL REGENERATION INITIATIVES

Aprior study by the Netherlands Environmental Assessment Agency (PBL, 2009a) has shed more light on the factors that drive regeneration activity. This research estimated the probability that an industrial site would be targeted by regeneration initiatives as a function of a number of pre-intervention characteristics of the site. This study deviated from the analysis in this paper in that it estimated the probability of occurrence of three distinct categories of plans for regeneration. Two of these categories addressed conversions to residential or non-residential urban uses respectively and fall beyond the

scope of this paper. PBL (2009a) estimated the probability that each site would be regenerated as a function of four categories of characteristics: features of the site itself, characteristics related to accessibility, characteristics of the surrounding area and regional characteristics. These characteristics capture most of the criteria for regeneration articulated in the municipal master plans, which are shown in Table 6.1. Since they also emerged during interviews with municipal officials (see e.g. PBL, 2009a), it is very likely that the variables cover all the important factors that drive municipal decisions to regenerate an industrial site. Therefore, this study employs the same pre-intervention characteristics to estimate the propensity score.⁶¹ The next section provides further details on how the pre-intervention characteristics relevant for regeneration are measured.

The probit regression used to calculate the propensity scores takes the following form:

$$P(\gamma_i = 1) = \Phi \left(\hat{\alpha} + \sum_{a=1}^N \hat{\beta}_a X1_i + \sum_{b=1}^N \hat{\beta}_b X2_i + \sum_{c=1}^N \hat{\beta}_c X3_i + \sum_{d=1}^N \hat{\beta}_d X4_i \right)$$

where, γ_i is a binary variable coded 1 (otherwise 0) if municipalities have carried out physical improvement projects on an industrial site (i) in the period of interest, regardless of whether the site was designated by the Topper or any other grant programme. $X1_i$ represents a matrix of characteristics of the site itself, $X2_i$ is a matrix of characteristics related to accessibility of site i , $X3_i$ is a matrix of characteristics of the surrounding area of site i , and, finally, $X4_i$ is a matrix of characteristics of the region in which site i is situated.

Since outcome data are available before and after the intervention, we have combined the propensity score matching method with a difference-in-differences estimator (or double-difference, DD). The DD approach compares treatment and comparison groups in terms of outcome changes over time, relative to the outcomes observed prior to the intervention. By taking the differences in outcomes over time, the calculation accounts for unobserved characteristics which are constant over time. The measurement moments before and after the intervention are defined on the basis of the start and ending dates of the projects on the site. While in all analyses, the measurement

61 A number of additional explanatory variables are included in the analyses: number of firms, employees per hectare, accessibility by public transport, industrial site designation and situation in a metropolitan area. It should be noted that directly measurable indicators were not available for all the regeneration criteria expressed in the master plans. This applies to vacancy levels, availability of parking space and crime rates.

moment before intervention is one year prior to the start of regeneration, the measurement moment after intervention varies between analyses as explained further below. The DD estimate for each regenerated site is calculated as follows:

$$DD_i = (Y_{i,after} - Y_{i,before}) - \sum_{j \in C} \omega(i, j) (Y_{j,after} - Y_{j,before})$$

where $\omega(i, j)$ is the weight given to the j^{th} control site matched to the sites that have been targeted by regeneration, i , on the basis of their propensity scores.

6.5 DESCRIPTION OF THE DATA

Industrial areas have been targeted by regeneration since the late 1980s, but this analysis only concerns sites where projects were implemented from January 1998 until December 2006. Sites on which regeneration was started before 1997 or in 2007 were excluded from the analysis. This procedure ensures that the regenerated sites that are considered in the analysis have not been affected by regeneration efforts as outcome changes are examined for the period 1997 to 2008. Since there is no standard for reporting information associated with physical regeneration, a questionnaire was sent to local economic development officials of all municipalities with at least one industrial site located within their boundaries. Information about the occurrence of interventions, the regeneration period⁶² and its basic features (types of projects, financial value) was obtained for the sites that were included in the national database of industrial sites (IBIS) in 2008.⁶³ Data were retrieved for 54% (1456)⁶⁴ of all industrial sites that existed in the period of interest. During this period municipalities have implemented physical improvement projects on 116 of these sites.⁶⁵ A number of variables related to the characteristics of the site

62 Some municipal respondents were not able to provide the year that regeneration projects were started. In this case, the year was determined by using information from municipal or provincial policy documents or media coverage. Sites for which no such information could be found were excluded from the analysis.

63 The analysis only addresses 'formal' industrial sites – areas that the local land use plan (*bestemmingsplan*) designates for firms operating in manufacturing and logistics industries, as well as commercial and financial services. Sites designated exclusively for offices are discarded.

64 Some 181 municipalities responded to the questionnaire – a 42% response rate.

65 The initiatives (partially) financed by the Topper programme constitute 15% of the sites that were targeted by regeneration.

have been derived from the IBIS file including its size and the amount of land already sold to firms.

In order to analyse changes in employment and firm numbers this analysis makes use of the LISA-database, which incorporates firm level micro-data. This annual survey contains information regarding the number of jobs, industry type (NACE-codes) and the physical address of all firms in the Netherlands. A distinction is made between five broad industry categories based on their NACE-codes. These five categories are: consumer services, financial services, logistics, manufacturing and the public sector. Firm addresses were geocoded to determine which street addresses fell within the geographical boundaries of sites included in IBIS. These data were also used to calculate several independent variables for the probit regression, including the share of workers in a specific industry and the industrial site type. The latter variable was measured as follows: when more than 50% of all firms located on a site were active in a specific industry, the site was considered primarily designated for this particular use. In the case that none of the five specific industries was dominant, the site was considered as a mixed use site. Outcome data on commercial property values for each year were derived from a database on taxation values for tax purposes from Netherlands Statistics (CBS).⁶⁶ These taxation values provide a reliable estimate of property values as they have to represent transaction prices in the open market. Individual commercial properties were assigned to industrial sites using their six-digit postal codes. This allowed us to calculate the average property value per industrial site.

The age of industrial sites is measured by applying optical overlay to determine in which period sites have become occupied by industrial uses. For this purpose, the geometry of industrial sites has been projected on topographical maps for the period 1950–1990 appearing with 10 year intervals. For sites developed after the 1990s, the IBIS database was used to calculate the age. The result is an age variable, which is categorised into five age bands. The ease of accessibility is calculated by averaging the Euclidean distance, which is measured in metres, from all firms located on an industrial site to the nearest motorway junction and bus stop.⁶⁷ In addition, a variable was created that measures whether the boundaries of an industrial site are intersected by a motorway (using a 100 metre buffer). This was done to indicate sites that are visible from the motorway. We define the surrounding area of the site by distinguishing between three types of land use: housing, water and other non-

66 Calculations are based on a micro-database provided by Netherlands Statistics (CBS) referred to as *‘Waarde onroerende zaken, welke afkomstig zijn van de Nederlandse gemeenten’*.

67 The bus stop variable is included in the model as a dummy, which equals 1 if the average distance to the nearest bus stop is equal to or less than 200 metres.

urban uses (e.g. nature, wetlands, forests, agriculture). For this purpose, the number of grid cells (measuring 10 x 10 metres) allocated to these particular land uses within a 500 metre radius was averaged over all LISA firms on the site. Analogous to the research by PBL (2009a), regional differences are accounted for by using the three regions Randstad, Intermediate zone and Periphery as distinguished by Van Oort (2004). In addition, data from CBS have been used to determine whether an industrial site is located in a metropolitan agglomeration, in its immediate vicinity or elsewhere.

6.6 EMPIRICAL RESULTS

6.6.1 PROBIT RESULTS

The probability that each industrial site is targeted by physical regeneration is estimated by a separate regression for two groups of outcome variables. The first group includes employment, number of firms and the intensity of use. In the second group the impact on property values is considered. For the last group, the probit specification also adds the average value of commercial properties located on the site. Given the large number of missing values for the property value variable, we prefer to estimate the additional effect of this variable in a separate regression. Table 6.2 reports the results from the two probit regressions. As expected, the age of the industrial site significantly affects the probability of occurrence of physical regeneration on an industrial site in both regressions. Regeneration tends to particularly take place on sites that were developed in or before the 1960s. Also, as property depreciation is likely to be highest on older sites, it is not surprising that we find a negative relationship between average property values and the chance for regeneration. Moreover, mixed sites are most likely to be subjected to regeneration.

While sites that accommodate a large number of firms are more likely to be regenerated, those with high shares of large firms are less likely. These findings seem intuitive: larger firms will be more prone to carry out the necessary investments in the physical fabric themselves. We see that this is particularly the case for sites that are owned by one large firm. By contrast, private regeneration initiatives are probably more difficult to get off the ground on sites with a more fragmented and weak ownership structure, so publicly funded regeneration is more likely to become necessary. Industrial sites with a bus stop, water or a large share of houses and non-urban uses nearby have a lower chance to be regenerated than other sites. Finally, sites that are located

Table 6.2
Probit regression results

VARIABLE	MODEL 1 (WITHOUT PROPERTY VALUES)		MODEL 2 (WITH PROPERTY VALUES)	
	Coefficient	Z-value	Coefficient	Z-value
Site characteristics				
Size	-0.0002	(-0.200)	0.0001	(0.120)
Share of public space	0.0001	(0.030)	-0.0001	(-0.030)
Workplaces per hectare	-0.0003	(-0.670)	-0.0006	(-0.920)
Share of land already sold/leased	0.0001	(0.040)	-0.0037	(-0.850)
Before 1960	0.7633	(2.080) **	1.2160	(2.250) **
1960-1969	1.0125	(2.790) ***	1.4526	(2.700) ***
1970-1979	0.5734	(1.590)	0.9996	(1.870) *
1980-1989	-0.0391	(-0.110)	0.3575	(0.660)
Manufacturing site	0.6654	(1.580)	0.8672	(1.570)
Mixed site	0.7839	(2.130) **	0.9645	(1.890) *
Services site	0.4886	(0.780)	0.8393	(1.120)
Sea harbour	-0.5787	(-1.090)	-0.2793	(-0.500)
Share working in consumer services	-0.0104	(-1.110)	-0.0135	(-1.300)
Share working in financial services	-0.0049	(-0.580)	-0.0075	(-0.820)
Share working in logistics	0.0032	(0.430)	-0.0002	(-0.020)
Share working in manufacturing	0.0022	(0.310)	0.0000	(0.000)
Number of establishments	0.0038	(3.830) ***	0.0031	(3.060) ***
Share of large firms	-1.2672	(-2.120) **	-0.1075	(-0.160)
Average property value			0.0000	(-2.780) ***
Accessibility characteristics				
Distance to nearest motorway junction	0.0000	(0.640)	0.0000	(0.380)
Near motorway	-0.1555	(-0.860)	-0.1483	(-0.780)
Near bus stop	-0.3330	(-2.070) **	-0.2641	(-1.580)
Characteristics of surrounding area				
Near water	-0.0003	(-2.320) **	-0.0003	(-2.270) **
Residential use	-0.0003	(-4.720) ***	-0.0004	(-5.150) ***
Non urban use	-0.0002	(-3.840) ***	-0.0002	(-4.050) ***
Regional characteristics				
Metropolitan agglomeration	0.4223	(2.530) **	0.4111	(2.380) **
Surrounding area MA	0.3642	(2.010) **	0.3743	(1.970) **
Periphery	-0.0067	(-0.040)	-0.1551	(-0.920)
Randstad area	-0.1959	(-1.190)	-0.1716	(-0.990)
Constant	-1.7212	(-1.950) *	-1.2244	(-1.130)
Number of observations	1,139		945	
Log Likelihood	198.67		184.17	
Nagelkerke R Square	0.27		0.26	

Notes: *** significant at the 1% level; ** significant at the 5% level; * significant at the 10% level.

in a metropolitan area or in the immediate vicinity of this area are regenerated more often. Contrary to the findings of PBL (2009a), access to motorways does not significantly contribute to the occurrence of regeneration. This may seem counterintuitive given the assumption underlying physical regeneration initiatives that good accessibility is an important location factor for firms. Possibly, this effect has been subsumed by the surrounding area variables. Greenfield sites, for instance, do not generally experience accessibility problems.

6.6.2 **COMPARISON OF REGENERATION SITES
AND MATCHED SITES**

Table 6.3 presents the results of the comparison between regenerated sites and matched sites for the outcome variables of interest.⁶⁸ The right panel of the table reports information for regenerated sites and their matched counterparts; the left panel considers sites that have been regenerated but for which no control sites could be found. These latter figures are included to demonstrate that there are no notable differences in the outcomes between matched and unmatched regenerated sites. For each of the three groups information is displayed in the following way: columns one, four and seven contain the average values one year before the regeneration projects were started; columns two, five and eight contain the average values two years after the regeneration measures were started. As physical regeneration typically involves the implementation of a range of projects that are phased differently over time, it is assumed that regeneration is at least partially completed in two years. Finally, columns three, six and nine present the first difference between these two measurement points. To ensure proper matching of time periods between regeneration and control sites, the measurement moments before and after are equal for each matched pair. On the far right hand of the table, the ‘difference-in-differences’ estimates (DD) are presented.

As can be seen from Table 6.3, none of the difference-in-differences coefficients are significant at the 10% level. Thus, the findings do not provide supportive evidence that any of the perceived positive effects identified in the municipal master plans has materialised. The robustness of the results is examined by replicating the analysis with two different matching procedures (nearest neighbour matching with a 0.01 radius and kernel matching). The results of the sensitivity analysis show that the zero-impact estimates remain

68 A test for equality of means indicates that there are no systematic differences in the observed outcomes between these two groups prior to regeneration.

Table 6.3

Mean impacts on outcome variables for regenerated and matched sites (measurement moments: before = one year prior to start regeneration, after = two years after start regeneration)

OUTCOME OF INTEREST	UNMATCHED TREATED (N=11)			TREATED (N=105)			CONTROL (N=1,011)		
	Before	After	Δ	Before	After	Δ	Before	After	Δ
Establishment growth (absolute)	112.44	121.86	9.42	99.00	106.91	7.91	102.34	108.50	6.16
Establishment growth (relative)			0.14			0.15			0.11
Share active in consumer services	22.88	23.97	1.09	23.28	24.21	0.93	19.31	20.31	0.99
Share active in financial services	13.85	14.14	0.29	13.47	13.78	0.31	16.12	17.33	1.21
Share active in logistics	27.79	26.97	-0.82	27.89	27.12	-0.77	28.42	27.53	-0.90
Share active in manufacturing	34.45	33.47	-0.98	34.39	33.48	-0.91	34.52	33.10	-1.42
Share active in governmental sector	1.03	1.45	0.42	0.97	1.41	0.44	1.62	1.73	0.12
Job growth (absolute)	2,357.43	2,409.95	52.52	2,010.51	2,063.16	52.65	2,021.13	2,043.46	22.33
Job growth (relative)			0.08			0.09			0.10
Share active in consumer services	11.15	11.79	0.64	11.37	11.86	0.49	9.92	10.59	0.67
Share active in financial services	11.33	11.05	-0.28	11.02	10.72	-0.30	12.59	13.99	1.41
Share active in logistics	24.15	23.92	-0.22	24.25	24.16	-0.09	25.47	25.30	-0.16
Share active in manufacturing	51.34	50.46	-0.87	51.33	50.71	-0.62	49.72	47.35	-2.37
Share active in governmental sector	2.04	2.78	0.74	2.03	2.55	0.52	2.30	2.76	0.46
Numbers of hectares sold (absolute)	50.31	51.29	0.98	44.12	45.22	1.11	40.79	41.12	0.33
Numbers of hectares sold (relative)			0.08			0.09			0.04
Employment-to-land-ratio	59.49	55.51	-3.97	59.76	55.49	-4.27	59.15	59.41	0.26
	UNMATCHED TREATED (N=5)			TREATED (N=110)			CONTROL (N=645)		
Property values (absolute)	527,547.71	630,654.65	103,106.93	524,436.57	625,491.35	101,054.78	548,178.77	641,109.51	92,930.74
Property values (relative)			0.22			0.21			0.21

Note: *** = significant at the 1% level; ** = significant at the 5% level; * = significant at the 10% level.

stable when different matching criteria are used to assign targeted sites to non-targeted sites using the propensity scores. As the propensity score method accounts for the counterfactual question, the findings indicate that, on average, the outcomes on regenerated sites would have been the same had there been no intervention. That is, in the absence of the regeneration efforts these sites would not have been worse off.

One possible explanation for these findings is that different types of physical improvement projects have opposing impacts on the outcome variables that, when considered jointly, balance out to near zero. To test this proposition, we focus specifically on the effects of regeneration initiatives that involve redevelopment of properties, as these projects are thought to have a more sizeable impact on the outcome measures. Columns one to three and four to six of Table 6.4, present the results respectively for regenerated sites with redevelopment of properties and sites on which municipalities have invested in infrastructure and the public realm only.

Apart from minor effects of redevelopment on average property values and of infrastructure and public realm improvements on manufacturing sector activities (at the expense of financial services), we find little evidence in support of the proposition that the impacts of different regeneration projects balance out to near zero. Instead, it rather appears as if none of the interventions being evaluated has much effect on the outcomes. A shortcoming of this analysis is that the number of matched regenerated sites with redevelopment of properties is rather small ($n=22$), which limits the usefulness of the analysis.

Another possible explanation for why we do not find any significant effects of regeneration might be that the time period considered in the analysis is too short for these measures to show any effect. Also, not all regeneration projects included in the prior analyses were finished within the two-year period. In the analysis presented in columns seven to nine of Table 6.4, we therefore change the measurement moments to one year prior and four years after the regeneration projects were started. In the second analysis presented in columns 10 to 12 of Table 6.4 we change the measurement moments to one year before the start of the physical improvement activities and two years upon completion of all projects. Again, apart from some sector compositional changes and changes in the amount of land that is sold no impacts are observed.

Table 6.4

Mean impacts on outcome variables for regenerated and matched sites, four different analyses: (1) redevelopment of properties, (2) no redevelopment of properties, (3) four years after start regeneration, (4) two years after finish regeneration

OUTCOME OF INTEREST	REDEVELOPMENT OF PROPERTIES			NO REDEVELOPMENT OF PROPERTIES			AFTER = 4 YEARS AFTER START			AFTER = 2 YEARS AFTER FINISH		
	Δ Treated (N=22)	Δ Control (N=283)	DID	Δ Treated (N=83)	Δ Control (N=1,003)	DID	Δ Treated (N=67)	Δ Control (N=999)	DID	Δ Treated (N=50)	Δ Control (N=999)	DID
Establishment growth (absolute)	8.36	7.19	1.18	7.80	5.89	1.90	9.96	10.79	-0.83	9.82	8.78	1.04
Establishment growth (relative)	0.11	0.07	0.04	0.16	0.12	0.04	0.23	0.21	0.02	0.39	0.21	0.1
Share active in consumer services	1.84	1.40	0.44	0.69	0.89	-0.19	0.75	1.64	-0.90	0.58	1.53	-0.94
Share active in financial services	0.70	0.50	0.19	0.21	1.39	-1.18 *	0.97	1.96	-0.99	1.10	1.52	-0.43
Share active in logistics	-0.85	-1.09	0.24	-0.75	-0.85	0.10	-0.67	-1.55	0.88	1.12	-1.33	2.46 *
Share active in manufacturing	-2.12	-0.86	-1.27	-0.59	-1.57	0.97	-1.47	-2.25	0.78	-3.20	-1.97	-1.22
Share active in governmental sector	0.43	0.04	0.39	0.44	0.13	0.31	0.43	0.20	0.22	0.39	0.25	0.14
Job growth (absolute)	10.68	-26.25	36.93	63.77	35.20	28.57	71.57	105.86	-34.29	50.22	76.06	-25.84
Job growth (relative)	0.04	0.04	0.00	0.10	0.11	-0.01	0.17	0.20	-0.03	0.20	0.19	0.01
Share active in consumer services	1.83	0.77	1.06	0.13	0.64	-0.51	1.03	1.05	-0.01	1.22	0.96	0.26
Share active in financial services	1.11	1.65	-0.53	-0.67	1.34	-2.01	-0.69	2.08	-2.78 *	-1.23	1.36	-2.58
Share active in logistics	0.49	-0.69	1.18	-0.24	-0.03	-0.22	-1.30	0.51	-1.81	0.40	0.13	0.27
Share active in manufacturing	-4.53	-2.26	-2.27	0.42	-2.40	2.82 **	-0.68	-4.21	3.53 *	-1.14	-3.14	2.00
Share active in governmental sector	1.10	0.53	0.57	0.37	0.44	-0.08	1.64	0.58	1.06	0.75	0.69	0.05
Numbers of hectares sold (absolute)	-0.98	-1.17	0.19	1.66	0.73	0.93	3.07	0.64	2.43 **	2.99	1.39	1.60
Numbers of hectares sold (relative)	0.17	0.02	0.16	0.07	0.04	0.03	0.25	0.07	0.18	0.13	0.07	0.06
Employment-to-land-ratio	-19.74	-2.78	-16.96	-0.17	1.07	-1.24	-11.02	-0.72	-10.30	-2.69	1.69	-4.38
Property values (absolute)	48,557.4	123,580.2	-75,022.8 **	115,705.2	84,377.4	31,327.8	185,034.5	140,882.1	44,152.4	173,327.8	152,487.9	20,839.8
Property values (relative)	0.17	0.24	-0.07	0.22	0.20	0.02	0.44	0.44	0.01	0.47	0.38	0.09

Note: *** = significant at the 1% level; ** = significant at the 5% level; * = significant at the 10% level; only the differences between the two measurement moments and the DD-estimate are presented. As in Table 6.3 the measurement moments before and after are equal for each matched pair.

6.7 CONCLUSION

The aim of this paper was to investigate whether regeneration policies that involve physical improvements of rundown industrial sites are successful in achieving their primary goals. Towards this aim we have studied a large number of master plans for regeneration initiatives to identify the goals and rationale underlying these policies. This investigation has revealed that the policy officials responsible for physical regeneration consider it primarily as a means to promote local economic development. As such, their expectations about what investments in physical improvement are supposed to do and what results can be expected to follow, are quite similar to those held by policy makers in the UK (Rhodes et al., 2005; Tyler et al., 2010) and the US (Byrne, 2010).

We have identified outcome measures that are in line with the most-commonly articulated economic development goals so as to be able to empirically test the effectiveness of physical regeneration using propensity score matching. The results of the analysis indicate that regeneration had a negligible impact on growth in employment, firm numbers, property values and the intensity in which land on the sites is used. In fact, the only notable, but ambiguous, effects of regeneration concerned the sector composition on sites. These zero-impact results withstand a number of sensitivity analyses (e.g. using different matching procedures, distinguishing between different types of measures, introducing time effects). They are also consistent with a previous study at the more aggregated municipal level by Marlet and Van Woerkens (2010) that finds that municipalities that have implemented physical regeneration projects on industrial sites are not experiencing higher employment growth.

This paper contributes to the existing evaluation literature by demonstrating that physical regeneration policies are failing to bring about their desired effects. We already noted that the evidence base on the impact of physical improvements is constrained, which makes it hard to provide comparisons with other countries. This particularly pertains to economic outcomes like firm and job creation as several studies have assessed the impact of physical improvements on residential and commercial property values.⁶⁹ In one of the few attempts in this direction, Byrne (2010) reports that the improvements associated with TIFs have no general impact on employment at the municipal level in the US, but that municipalities that have adopted specific TIFs for industrial development do experience a positive effect on

69 These studies provide mixed evidence on the effectiveness of physical regeneration (see e.g. Dye & Merriman, 2000; Laverne & Winson-Geideman, 2003; Weber et al., 2003; Wachter et al., 2007; Tyler et al., 2010).

overall employment growth. The author therefore concludes that the ability of the physical improvements associated with TIFs to deliver on the promise of more jobs ‘may be overstated’ (Byrne, 2010, p. 21). Neumark and Kolko (2010) find that the physical projects undertaken in redevelopment areas in California do not have positive effects on employment and firm numbers. It should be noted, however, that the primary objective of their research was not to provide a reliable estimate of the impact of these measures, but to assess whether enterprise zones have different effects when they are combined with other area-based policies. For the UK, Gibbons, Overman, and Sarvimäki (2010) evaluate the effects of public investments aimed at the provision and improvement of business floor space. Their findings indicate that these initiatives funded as part of the Single Regeneration Budget programme had no effects on job growth.

A number of possible explanations why no impact of regeneration is found in this study can be identified. A first explanation might be related to the fact that the number of observed industrial sites on which regeneration projects are fully implemented is relatively small. Secondly, we have restricted our measurements of impact primarily to economic development outcomes, although our study of master plans has indicated that regeneration also serves broader goals like environmental improvement. These latter outcomes might be positively affected by regeneration. A third explanation is that regeneration policies were poorly implemented. We already indicated that regeneration activity may be driven by political opportunities as much as by the perceived problems at the site. In that respect, the Nicis Institute (2009) reports that many municipal officials consider securing grants, whenever possible from various sources, as their main business. A fourth explanation might be that the assumptions underlying regeneration policies are faulty. In particular, this may hold for the assumption that improving location factors will result in firm and employment growth. Several studies have previously shown that firms’ decisions to relocate are mainly determined by firm internal factors and to a lesser extent by site-related factors (see e.g. Van Dijk & Pellenburg, 2000). To answer the question which of the two explanations is most appropriate the findings from the statistical analysis should be complemented by interrogations and observations of the firms located on sites that are subjected to regeneration as well as the policy officials responsible for regeneration.

These conclusions are not necessarily generalisable to regeneration initiatives aimed at physical improvements elsewhere. In the Netherlands interventions are often undertaken at an early stage when the process of decay and decline has just set in. Contrary to the practice in other countries (i.e. US, UK), less needy places are subjected to regeneration as evidenced by the fact

that most sites are still in use when these initiatives commence. This can be partially related to the Dutch planning culture, which has been characterised as having high ambitions for the quality of the environment, combined with a fair degree of government intervention in order to realise these ambitions (Needham, 2007; Buitelaar & Sorel, 2010). In addition, we already pointed out that political motives might have driven the decision to regenerate an industrial site. Political impetuses may have hindered effective implementation, but they will almost certainly play a role in the adoption of regeneration strategies in other countries as well. Indeed, political factors have been shown to influence the targeting of regeneration initiatives in the US and elsewhere in Europe (Greenbaum & Bondonio, 2004; Byrne, 2005).

7 CONCLUSIONS



The general aim of this thesis was to assess the impact of planning policies, when defined broadly as all government interventions in the development process, on the performance of the industrial property market. The role of the Dutch planning system in shaping the supply of business space has been subject to extensive policy debate since the 1990s, but it had little impact outside the policy community. This changed, however, in the past decade when the policy issue began to occupy the minds of the general public and the media. This broadening of interest also signalled a change in the nature of the debate. Two decades ago, policy interest was fuelled by worries about imminent land shortages in the industrial market. The emergence of these shortages was attributed to the inability of the planning system to ensure an adequate supply of land for business development. It was suggested that the resultant constraints on business development would seriously impede economic growth. By the mid-2000s, quite the reverse was claimed, with many commentators arguing that there was an oversupply of land allocated for business uses. Whereas the earlier debate had concentrated on the economic costs associated with supply constraints, attention now turned to the potential benefits of planning restrictions and other policy initiatives impacting on the industrial market. Most emphasis was placed on the role of these policies in reversing the fortunes of rundown sites. Initiatives designed to improve the physical environment of these sites would make them a more attractive place to do business and thereby raise investment in these areas. In addition, it was argued that lower levels of greenfield supply were likely to reinforce these investment patterns. The restriction of greenfield development thus came to be viewed as an important instrument to regenerate rundown industrial sites.

Unfortunately, there is very limited evidence on the actual effects of these policies. As a result, the impacts of planning policy on the industrial property market are not well understood. This thesis has sought to contribute to such an understanding. The aim of the next section is to summarize the main findings of this research. The chapter then proceeds by discussing its contribution to existing research and suggesting directions for future research. Finally, the implications for policy are outlined.

7.1 THE IMPACT OF PLANNING POLICIES ON THE PERFORMANCE OF THE INDUSTRIAL PROPERTY MARKET

In chapter 1, four research questions have been formulated that addressed 1) how municipalities determine the overall quantity and price of land made available for industrial development; 2) whether physical regeneration

initiatives are delivered in appropriate areas, given their underlying goals and objectives; 3) to what extent the planned provision for new industrial development affects private sector investment in existing areas; and 4) whether or not physical regeneration initiatives are effective. The four questions are dealt with in the four paragraphs below. This section concludes with a discussion of the results in relation to the overarching aim of this thesis.

7.1.1 PROCESS OF MUNICIPAL LAND DEVELOPMENT

The first research question asked: *How do municipalities determine the overall quantity and price of land to be made available for industrial development?* By providing land for industrial development themselves, municipalities seek direct control over which parts of the land actually get developed. In doing so they have attempted to prevent an ‘implementation gap’ (Bramley, 1993) between land allocations for industrial development and actual development. Chapter 2 has demonstrated that municipal decisions to make more land available for development are based on the principle that the amount of land has to be sufficient to secure a steady supply of serviced plots. One hectare taken up, one new hectare supplied! As a rule of thumb, the available stock of serviced building land should be equivalent to two to five times the average annual take-up. It is therefore not surprising to find that municipal decisions to make more land available are primarily informed by extrapolating previous take-up rates onwards. In addition, the projections that guide land allocations for industrial development are also generated by considering previous as well as current take-up levels (also see Ploegmakers & Van der Krabben, 2012).

Not only have municipalities provided a plentiful supply of development land, it seems that they have also offered the land at relatively low prices. Chapter 3 has explored how municipalities determine eventual selling prices. The comparative method is the preferred valuation approach amongst municipalities. This technique entails making a valuation by using evidence from prices for similar plots in similar locations. The examinations undertaken in the chapter were not designed to permit conclusions as to whether land values are actually below the maximum price that firms would be willing to pay (given by the residual value), which would be consistent with common perception, but they demonstrate that asking prices are crucially dependent on the extent of competition that municipalities face from each other. The comparative method drives municipalities towards using previous valuations as benchmarks for pricing building plots and this clearly produces delays in recording changes

in the market environment. It might even fix prices at a stable level for some considerable period. This is what seems to have happened in the more peripheral parts of the Netherlands, where land prices are still close to the amount needed to cover the costs of development, even if municipalities no longer adopt the cost approach to determine land prices.

The reliance of municipalities on comparative evidence might have an indirect effect on supply because their expectations of development values, and thus the financial viability of a proposed scheme, will be strongly influenced by past trends. This does not necessarily imply that outcomes would have been different had municipalities used the residual valuation method for estimating development values and appraising the financial viability of a development scheme. In chapter 2, it was argued that the residual valuation exerts the strongest influence on development decisions when it is used to calculate the maximum value of a site that a developer is considering purchasing. It seems, however, that at least in the past, municipalities did not employ appraisals for this purpose because they often acquired agricultural land well before actual development commenced. In addition, municipalities might still pursue development of a particular scheme where estimated profits are negative, because profit considerations are not the main motive behind their decisions to make more land available for industrial development (see chapter 2). If the use of the residual valuation were to result in different development outcomes, it would be by increasing development activity because there is a widely held view that development values will be higher when they are derived residually (see, for example, Van der Krabben & Buitelaar, 2011; Van Dinteren, 2012).

7.1.2 TARGETING OF REGENERATION INITIATIVES

The second research question asked: *Are physical regeneration initiatives being delivered in appropriate areas?* The effectiveness of regeneration policies might depend critically on these initiatives being delivered in the right areas. According to the literature examining economic development policy, reviewed in chapter 4, initiatives that target particular areas have to be targeted at the most economically distressed areas for them to be successful in stimulating economic growth. A selection model, similar to the one presented in chapter 6, has been used to investigate the factors that municipalities take into account in deciding whether to designate a particular site as a regeneration area. This analysis utilized information on a sample that consist of sites targeted by the latest national regeneration programme. This programme would involve two implementation rounds, the first round covering the period between 2009

and 2013, the second round spanning the period between 2014 and 2020.⁷⁰ This sample was chosen because it permits an analysis of the influence of variables measuring the level of economic distress, as well as growth trends in these variables prior to the designation of the site as a regeneration area.

The findings of this model suggest that, while regeneration initiatives are delivered in areas characterized by a range of problems associated with the state of the physical environment, these areas do not exhibit higher levels of economic distress in terms of a decline in employment, firm numbers and property values. Therefore, the industrial sites subject to regeneration are not necessarily the sites in need of intervention. This finding is confirmed by evidence from the latest IBIS survey, which indicates that municipal decisions to implement regeneration projects on a site are not likely to be based on economic merit. Less than one fifth of all potential regeneration areas has been designated on the basis of explicit economic distress criteria. These criteria typically include factors such as a decline in jobs and productivity losses, but may also be related to the presence of properties that are economically obsolete (ARCADIS, 2013). A likely explanation for this result is that political and strategic factors have played a role in the decision to designate these sites. This strongly resonates with some of the observations contained in the evaluation of the Topper programme, which targeted regeneration funding at 3,500 hectares of rundown land: *'The definition of a rundown site is quite flexible. Several municipal project leaders have indicated that a site 'will quickly become obsolete, whenever there is a possibility to raise money'* (Nicis Institute, 2009, p. 52; author's translation). The authors conclude that securing grants, preferably from a range of different funding sources, has become a profession in itself.

7.1.3 THE IMPACT OF THE PLANNED PROVISION FOR NEW INDUSTRIAL DEVELOPMENT

The third research question asked: *What is the impact of the planned provision for new industrial development on both new construction and refurbishment activity?* In the Netherlands the view is widely established that restrictions on greenfield development could assist in the regeneration of existing industrial areas. The cheap and plentiful supply of land for new industrial development is thought to reduce the incentive for redevelopment and refurbishment of aging premises on existing sites, contributing to the decay of these areas. Interestingly, the evidence presented in chapter 5 does not support this claim. The overall amount of land which is available in the local

⁷⁰ The national government decision to terminate all regeneration funds by 2014 implies that the central government is not involved in this second round.

market area does not appear to be influencing refurbishment and redevelopment activity at the individual site level. It thus seems that restrictions on greenfield development will not necessarily assist in reversing the processes of decay of older industrial areas. Chapter 5 has also explored how the available supply at the site-level influences investment activity. As one might expect, the amount of land available at the site does not influence refurbishment activity. It does, however, affect investment in new commercial buildings, although this influence appears rather weak. This suggests that the actual pattern of new industrial and business development is not primarily driven by land availability. Instead, the evidence suggests that quality and locational characteristics are more important in the firm's decision to construct a new premise on a particular site.

7.1.4 THE EFFECTIVENESS OF PHYSICAL REGENERATION INITIATIVES

The fourth research question asked: *Are physical regeneration initiatives having the desired effects?* Integral to regeneration of rundown industrial sites is the objective to increase private sector investment. This objective is based on the premise that public investments in the physical environment of the site are to pave the way for significant investment by the private sector, with firm investment being the most prominent source of private sector finance sought after. Public investments are typically directed to improvements of road infrastructure and the public realm (streetscaping, lighting, landscaping), but they may also facilitate redevelopment projects, through land assembly and site servicing. Physical improvements are not only expected to improve the appreciation by existing firms of their environment, thus making them more willing to invest in their premises, but are also supposed to encourage new investment in these areas. The findings suggest that publicly financed improvements will indeed stimulate investment in commercial buildings. This is true for investment in new structures and for refurbishment of existing ones. It appears that it is the actual timing of regeneration projects that stimulates investment by firms in their premises: investment activity is more likely to take place in the period that physical improvement activities are undertaken on the site. Furthermore, the level of expenditure will be higher during the period that sites are subject to physical regeneration interventions.

Regeneration initiatives seek to accomplish other goals as well. An analysis of master plans has revealed that the most frequently expressed goals relate to the attraction or retention of firms and job creation. Chapter 6 has demonstrated that, overall, regeneration initiatives do not have a noticeable impact on these outcomes and that sites would not have been worse off had

there been no intervention. One would expect redevelopment projects to have a greater impact on job growth and business activity, compared to investments in the public realm. Therefore, the analysis also controlled for different types of regeneration activity by dividing the sample into sites where municipalities had undertaken redevelopment projects and sites where they only funded improvements of road infrastructure and the public realm. This did not change the findings. Neither did introducing different time windows to account for the fact that regeneration effects may take time to build up.

7.1.5 THE IMPACT OF PLANNING POLICIES ON THE PERFORMANCE OF THE INDUSTRIAL PROPERTY MARKET

Given the broad range of planning policies impacting on the industrial market, the treatment of relevant policies has been necessarily selective, covering those policies that arguably have the most profound impact on the industrial property market – that is, land use planning and regeneration policies. These policies have been subject to the most intense debate. In this context, it has been argued that successful regeneration requires an appropriate mixture that combines restrictions on greenfield development with targeted policies, designed to improve the physical environment of rundown sites. However, this research does not lend support to the claim that constraints on greenfield supply can assist in fostering regeneration of rundown areas, by steering redevelopment activity into these areas. Also, land availability only has a weak effect on new construction, suggesting that the actual pattern of new industrial development is not likely to be constrained by the available land supply. From this it can be concluded that municipalities have taken sufficient action to ensure that land availability is not a major constraint on new development. This is supported by the qualitative evidence presented in chapter 2, which was summarised above.

That physical regeneration encourages investment activity, while having a negligible impact on employment and business growth is quite surprising, since investment in commercial property is often portrayed as a necessary condition for firm growth. Expanding firms will require additional floor space and premises with appropriate characteristics in terms of layout and physical facilities may contribute to their productivity (Turok, 1992; Ball et al., 1998; Ball & Nanda, 2014). The availability of suitable accommodation may also help to attract new firms to the area. There are three potential explanations for this finding. First, regeneration initiatives may have been implemented in a way that is inconsistent with the rationale of promoting economic development. The empirical findings

presented in chapter 4 are consistent with this observation. Second, while regeneration initiatives do not seem to influence firm employment, it may well be that they have had positive effects on other measures of firm performance (earnings, labour productivity, output levels). Gibbons, Lyytikäinen, Overman, and Sanchis-Guarner (2012) find that improvements to road infrastructure do affect firm-level productivity, output and wages, but with no employment effects for these firms. The explanation offered by the authors is that lower transport costs allow reorganisation, which results in increased output. This, in turn, will result in higher firm productivity. It should be noted that this study focused on the impact of improvements to the major highway system. It is questionable whether similar effects can be expected for the small-scale infrastructure improvements associated with physical regeneration. A third explanation for these contradictory findings, is that the analysis of building investment utilizes data on a different – smaller – sample of sites. Also, the approach used to assess the impact of regeneration on investment activity does not fully adjust for biases resulting from uncontrolled selection. This is an issue to which this chapter will return later.

7.2 CONTRIBUTION TO EXISTING RESEARCH

The research reported in this thesis has applied a variety of methodological and analytical approaches to establish a better basis for understanding the relationship between planning policies and the performance of the industrial property market. In chapter 5, an attempt was made to advance econometric analysis of the impact of planning policies by examining supply at the micro level. At lower levels of spatial aggregation local characteristics increasingly drive the supply-side, but these cannot easily be incorporated in existing models of building investment. Therefore, a theoretical model is proposed that combines conceptual frameworks developed in macroeconomic studies of investment in fixed capital (capital stock adjustment models) and the location theory literature. In chapter 6, methodological approaches and techniques are borrowed from the field of programme evaluation to assess the impact of regeneration initiatives. These approaches are employed to evaluate whether regeneration policies have produced the desired outcomes, but also to gain a better understanding of how these policies are expected to engender these outcomes. Finally, chapters 2 and 3 apply ideas from the tradition of old behavioural economics. Central to this tradition is a commitment to empirical inquiry at the micro level – detailed studies of the decision making processes employed by firms, consumers and other economic actors. These chapters thus

draw from in-depth interviews to explore the decision-making of municipalities in the industrial land market.

As such, this research responds to calls for greater methodological pluralism in property research (see e.g. Guy & Henneberry, 2002; McMaster & Watkins, 2006; Marsh & Gibb, 2011; Smith, 2011). The case for greater pluralism has also received increased support in the literature that explores the relationship between planning policies and the performance of property markets. Adams, Watkins, and White (2005b), for instance, state that methodological diversity is *'an essential ingredient in the improved analysis of the influence of public policy on commercial and residential property markets'* (also see Adams & Watkins, 2014). Against this background, it is often argued that alternative modes of analysis should be viewed less as competitors and more as complements. The approach of Monk and Whitehead (1999) is illustrative. They suggest that the behavioural approach they put forward has two broad purposes. The first is to complement neoclassical economic models by exploring how the behaviour of planners and other market actors leads to the outcomes predicted by the model. The second purpose is applicable to situations in which the neoclassical model fails to predict observed outcomes. In this case, the neoclassical model is still the point of departure, and subsequent analysis aims to investigate how planning constrains supply and how these constraints are exacerbated or mitigated by the actual behaviour of actors. As a result, the behavioural approach can help to fill in some of the 'gaps' in the neoclassical economic model (Monk & Whitehead, 1999, p. 92). In contrast, chapter 3 has sought to establish a stronger link between qualitative research and quantitative, econometric analyses by merging these different methodological approaches. More specifically, it has demonstrated how specific patterns and regularities in valuation behaviour identified in qualitative research can be used to improve the specification of existing hedonic pricing models or even assist in the development of new models that better capture the processes through which prices are arrived at.

This research contributes evidence to the Dutch policy debate concerning the impact of planning policies on the industrial property market. To a certain extent, these insights can be expected to be generalizable to policies impacting on industrial property markets elsewhere. For example, it has long been recognised by policy-makers in many countries that direct public spending in physical regeneration is an important means to stimulate economic development in regeneration areas. Yet, important differences may exist between the regeneration interventions evaluated in this research and those in other international contexts. First, as chapter 6 indicated, the principal focus of Dutch initiatives in the targeted areas is on the provision of new or improved

infrastructure and improvements of the public realm. In the UK, on the other hand, a much larger proportion of public expenditure in these areas (two thirds) is devoted to land assembly and site servicing (Tyler et al., 2013). Second, Dutch governments often intervene in an early stage when the process of physical decay has just set in so as to prevent a downward spiral of decline. This is clearly exemplified by the fact that the scale of the brownfield problem is much smaller in the Netherlands as compared to other European countries and the US (Oliver, Ferber, Grimski, Millar, & Nathanail, 2005).

As it turns out, however, the findings reported in this thesis are broadly consistent with the small, but growing international literature examining the impact of physical regeneration on economic outcomes (also see chapter 6). Byrne (2010) finds that TIF adoption, in general, does not lead to higher employment at the municipal level in Illinois. However, municipalities that have adopted specific TIFs for industrial development do experience a positive effect on overall employment growth. Looking at individual neighbourhoods, Lester (2014) finds no effects of Chicago's TIF districts on employment or the number of business establishments. Neumark and Kolko (2010) also conclude that the physical projects undertaken in redevelopment areas in California have not had much success in stimulating employment or attracting businesses. For the UK, Gibbons et al. (2010) evaluate the effects of the public provision of business floor space funded through the Single Regeneration Budget. Again, this study finds the job creation record of these initiatives to be negligible at best. Interestingly, Lester (2014) also finds no significant effects of Chicago's TIF programme on investment in commercial buildings, which is obviously not consistent with the conclusions of this thesis. In chapter 5, two potential explanations were offered for these contradictory results. First, the study's reliance on aggregate measures of investment activity might mask variations in the impact on separate types of investment (new construction, refurbishment). Second, this study does not discriminate between different types of projects, while different projects may have a differential impact on investment by their purposes and the type of area concerned.

The findings concerning the impact of land use regulations, which appears to be relatively small, are not necessarily transferable to other international contexts. Planning regulations are not likely to restrict new industrial development in the Netherlands, because municipalities have generally ensured that land for industrial development is adequately supplied. In other countries, however, the constraints on the supply for industrial development might be more severe, especially in the UK where planning has been increasingly cast in a regulatory rather than a proactive role. Cheshire (2013), for example, asserts that the UK planning system constrains the supply

of land for all categories of urban development, including the industrial sector. He claims that this is primarily because the tax revenues coming from business property accrue to national, not local government, while local authorities have to provide services to these uses. As a result, local authorities are expected to be extremely reluctant to allocate more land for industrial and commercial uses (also see Cheshire & Hilber, 2008). In contrast, Bramley and Kirk (2005) contend that the British planning system exerts relatively little control over industrial and business development since local authorities consider the availability of land for these sectors as an important prerequisite for local economic growth. They present evidence from Central Scotland that confirms the claim that land availability is not likely to be a major constraint on new business development, which is in broad agreement with the findings of this thesis. The only other study to examine the impact of planning on industrial development in the UK, carried out by Henneberry et al. (2005), also concludes that planning has a relatively weak effect on development activity (and prices) in the industrial property market.

No research has yet reported a significant adverse effect of land use regulations on new industrial development in the US, with the exception of Sivitanidou and Sivitanides (1995), who find that planning restrictions increase the costs of industrial space by raising industrial rents. In general, planning regulations are not likely to constrain industrial development in the US. In contrast to the UK, the fiscal system provides a very strong incentive for local authorities to encourage commercial and industrial development. Business property taxes make up an important source of income to local governments since the tax revenues from business property exceed the cost of providing services to business (Quigley & Raphael, 2005; Cheshire, 2013). In fact, this system even encourages local governments to compete for business development among each other. Finally, turning to the relationship between greenfield land release and regeneration, Nelson et al. (2004) report that the restrictions imposed by growth management programmes encourage significant industrial investment in central cities in the US. More recent work by Woo and Guldmann (2011) also suggests that these policies may assist in central-city regeneration. However, since both studies make use of data aggregated at the city-level, one does not know whether these regulations have actually encouraged investment in rundown areas *within* these cities.

7.3 LIMITATIONS OF THE RESEARCH

One of the main limitations of this research, which impinges on nearly all evaluations of regeneration initiatives, is that the evaluation approach does not explicitly address selection biases that might be caused by unobserved variables affecting an area's performance and its designation as a regeneration area. The use of instrumental variables is a widely accepted strategy for dealing with this problem. This approach requires finding some instrumental variable that predicts programme participation but does not affect outcomes beyond its effect on participation in the programme – the exclusion restriction. That is, the instrument is uncorrelated with unobserved variables affecting those outcomes. However, no variables could be obtained that satisfied the exclusion restriction. Hence, whether or not the regressions employed in chapter 5 are effective in reducing this potential bias in the estimates of the net effects of regeneration policies, depends on whether data has been obtained for all (major) factors that affect both investment activity on a site and its designation as a regeneration site. Indeed, the estimations reported in chapter 5 do control for a rich set of explanatory variables.

Although propensity score matching, which was used in chapter 6, relaxes the linear functional form assumption inherent in standard regressions, it does not necessarily solve the problem of selection on unobservables. Again, it will only work if all important variables that affect both programme participation and the outcomes of interest are included and not just the ones available in the dataset. To reduce the potential bias arising from selection on unobservables, the propensity score matching method was combined with a difference-in-differences (DD) method. By taking the differences in outcomes over time, this method accounts for unobservables which are constant over time. However, this method cannot deal with unobserved variables that vary over time.

A further limitation relates to the outcome measure of main interest to this thesis: private sector investment. Building permit activity provides a robust measure of building investment and has been the variable of preference for most studies that investigate expenditure on structures at the city level (see e.g. Dawkins & Nelson, 2002; Nelson et al., 2004; Green et al., 2005; Glaeser & Ward, 2009; Bramley & Watkins, 2014) or the individual building or neighbourhood level (Helms, 2003, 2012; Lester, 2014). Nevertheless, building permit data present several deficiencies. First, even though an applicant will have already made significant commitments to a specific scheme before submitting a building permit application, not all permits result in immediate building work and some projects may not get implemented at all. Second, this measure does not cover all investment activity in commercial property because owners can make

modest changes to buildings without the need to apply for a building permit. Third, building permit data measure a particular type of firm investment, i.e. expenditure on building structures. This is but one source of firm investment, besides expenditure on machinery and other capital equipment. Finally, building permit data could be obtained for a relatively small sample of 57 municipalities and the data only permit an analysis over a relatively short period of time, during which the market in general was rising. It might be interesting to examine the way in which policy impacts on the industrial market at different stages of the property cycle.

Another important limitation is that this thesis has drawn on qualitative data to investigate the behaviour of one particular type of market actor – municipalities. Monk and Whitehead (1999) rightly propose to explore the behaviour of a range of market actors (landowners, developers, planners) to gain a better understanding of the mechanisms through which planning policies affect market outcomes.

7.4 DIRECTIONS FOR FURTHER RESEARCH

The latter limitation also presents a challenge for future research. The (old) behavioural approach adopted in chapters 2 and 3 could be extended to investigate the investment decision processes of the firms that occupy industrial property, by observing these processes directly or by interviewing firms about the procedures by which investments in property are planned and implemented.⁷¹ This is particularly interesting in the light of the modelling results presented in chapter 5. Although the models provide a plausible account of investment activity, their explanatory power is quite low. In chapter 5, it was argued that this might be related to the presence of considerable noise and discontinuities in the annual data. However, fitting the same models to five-year averages of the explanatory variables only slightly adds to their explanatory power. It may be argued that qualitative analysis can start to unravel what these micro-level models fail to explain (also see Bramley, Leishman, & Watkins, 2008, p. 207). The insights generated from such modes of inquiry might, in the end, also improve the way in which property investment is modelled.

The behavioural approach also provides a potentially useful framework to test the validity of the programme theory that underpins regeneration policies,

⁷¹ It is important to remember that the majority of building investments is performed by the firms themselves.

that is, the assumptions and expectations held by policy makers about how regeneration intervention is supposed to work. In other words, do they have a valid view of how physical improvements are to attract new firms to the site and encourage investment by existing ones? Elsewhere, some work has already been carried out in this direction. Roberts, Rowley, and Henneberry (2012) conducted interviews with occupiers of business space to explore how improvements to the aesthetic quality of business parks influence their investment decision-making process. Jackson and Watkins (2011) also draw on qualitative evidence from in-depth interviews to investigate how planning policies, including regeneration initiatives, feed into the decision-making of property investors in the retail sector. Finally, it is to state the obvious that the approach adopted in this research can also be employed to provide more realistic micro foundations of the behaviour of other actors, operating in different property markets.

There also is considerable scope to build further on the quantitative research reported in this thesis. The unique nature of the dataset compiled for this thesis has not been exploited to its fullest extent. Despite some of the concerns raised above, there still is merit in exploring investment activity at the level of individual buildings or firms – perhaps, guided by insights generated from qualitative research. Even though the majority of business premises are owner occupied, such work would ideally require information about the personal characteristics of the property owners so as to separate owner occupiers from renters (this can also be said of the estimations presented in chapter 5). Unfortunately, no such information is recorded in the dataset. There are also opportunities to better account for the implementation features of different regeneration initiatives in the evaluation. The impact of regeneration activities on employment change, business creation and investment activity might be critically dependent on the specific features of these initiatives, such as the amount of public investment and the precise type of activities (in fact, the evaluation presented in chapter 6 attempts to account for the latter features). It would also be interesting to examine whether physical regeneration initiatives are more effective in areas where there is a short supply of land relative to market demand, as suggested by PBL (2009a). The collection of additional data could also improve the research. For example, information could be collected on a larger cross-section of municipalities and over longer time periods to account for the fact that the effects of planning policies may take time to build up. Finally, as suggested in chapter 5, future work should seek to address the potential problem of endogeneity related to the indicators of planning intervention.

7.5 POLICY IMPLICATIONS

7.5.1 PHYSICAL REGENERATION

The results of the most recent regeneration spending round, which involved a substantial increase in budget, already began to show in 2009, with regeneration activities delivered at almost 1,500 hectares of core regeneration sites in that year (ARCADIS, 2011).⁷² In the years up to 2014, regeneration proceeded apace, with an average of 1,400 hectares improved each year. As a consequence, the number of hectares improved even began to exceed the national target set for this period. Against this background, the Minister responsible for spatial planning policies claimed that the latest spending round had been quite successful (I&M, 2014). However, what is really of interest here is whether regeneration policies have contributed to reversing the fortunes of these areas. This thesis has employed a different, and arguably more informative, standard to judge the accomplishments of regeneration policies: the degree to which they have been effective in achieving their primary goals. When judged against this standard, the success of these policies is dubious at best. While regeneration activity seems to encourage increased investment on the sites concerned, it does not deliver on its promise of jobs and business creation.

Obviously, these findings do not indicate that no job or business growth occurred at all on these sites. Rather, the outcomes on these sites would have been the same had there been no intervention. Nor do they imply that particular regeneration schemes did not end up creating jobs or attracting new businesses. Instead, the conclusion should be that *on average* regeneration has not been very successful in stimulating economic development on these sites. Finally, this research has focused on sites that have been subject to regeneration intervention before 2008 and one might be tempted to argue that recent regeneration initiatives have been more effective due to the significant increase in regeneration spending.⁷³ However, these additional resources have not been used to target greater levels of investment at individual sites. Rather, the increased budgets were utilized to undertake regeneration activities at a greater number of sites (or better: hectares).

72 To put this figure in perspective, between 2004 and 2007 only 325 hectares of rundown land had been improved annually (see chapter 1).

73 Besides the national government, the provinces have also made available substantial funds for regeneration. Between 2010 and 2013, provinces have spent around €226 million on core regeneration sites (ARCADIS, 2013).

There are several ways in which those involved in the formulation and implementation of regeneration policies might improve policy effectiveness. First, it is perhaps more effective to target public investment exclusively at sites characterised by high levels of economic distress. In the current situation, the prevailing criteria to designate a regeneration site are related to the state of the physical environment, but sites should be designated on the basis of explicit economic distress criteria (decline in employment and firm numbers, productivity losses). Second, public expenditure in the public realm should be tied upfront to private sector contributions. This ensures that firms will have a real stake in the improvements undertaken on the site. Third, redevelopment projects could be financed through revolving loan funds. In the past years, five provinces have created such funds, through the establishment of redevelopment corporations. These bodies provide loans to prospective developers or firms in order to facilitate redevelopment and refurbishment of land and property. These funds help fill a financing gap, where borrowers are unable to secure all what they need from commercial lenders at affordable rates. Eventually, such funds could (partly) eliminate the need to call upon scarce public resources to fund redevelopment projects. Nevertheless, policy makers should be cautious in using physical regeneration interventions as an instrument to promote economic development. The results presented in this thesis are not supportive of the basic assumption underpinning regeneration policies that there is a strong relationship between the physical environment and economic growth.

7.5.2 THE PROVISION OF LAND SERVICED FOR DEVELOPMENT

Over the years, municipalities in the Netherlands have been quite successful in ensuring an appropriate land supply for industrial and business development, through direct management of overall land supply. It is thus no surprise that this proactive approach to planning has been acclaimed as an important market stimulus action in other countries, especially in the UK, where development land generally is in short supply (see e.g. Barker, 2008; Adams & Watkins, 2014). This approach is, however, not without costs to the municipality. Due to their strong reliance on previous take-up rates, the expectations of municipalities seem to be conditioned by previous experience. It is for this reason, and because it takes several years to develop a site, that they do not succeed in anticipating turning points in the market. Therefore, one would expect that during an upturn the probability of overestimates and subsequent oversupply of land increases and vice versa during a down turn. And this is

precisely what has happened during the first four years following the outbreak of the global financial crisis (see ARCADIS, 2013). As a result, municipalities have to incur substantial losses on their land holdings due to increased interest costs and lower revenues. It has been estimated that the total losses on land serviced for industrial development will range between €200 to €900 million (EY & Fakton, 2015).

The conclusion is that Dutch municipalities do not cope well with the uncertainties inherent to land and property development. Private developers in the Netherlands have also been severely affected by the crisis with many developments halted and numerous companies having gone bankrupt, suggesting that private developers are not able to cope any better with those uncertainties. The development risks of poor predictions are borne by the private sector, when the role of the municipality in the industrial land market is restricted to allocating land for development in a plan, informed by some forecast of demand. When, however, the municipality is also directly involved in the release of that land, it is the municipality itself that will face those risks (Ploegmakers & Van der Krabben, 2012). This then raises the question of whether all municipalities are fully equipped to take on these risks.

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SUMMARY

Since the beginning of the nineties, national and local governments in the Netherlands have devoted significant resources to regenerate rundown industrial and business sites. The national government alone is estimated to have spent around €770 million on regeneration initiatives between 2000 and 2013. These initiatives are typically targeted at industrial sites suffering from some form of physical decline: obsolete properties, underused land, deteriorated public spaces, inaccessibility and outmoded infrastructure. Local authorities (municipalities) have principal responsibility for regenerating these sites. As a consequence, they are the main recipients of regeneration funding, although they also finance regeneration initiatives themselves. Regeneration activities undertaken by municipalities are almost exclusively directed towards improving the physical environment of the area concerned. These include investments in the public realm, infrastructure improvements, removal of undesired activities and the assembly and servicing of sites for redevelopment. Integral to regeneration is the premise that public investments in the physical environment are to pave the way for increased investment by firms. Unfortunately, however, little is known about how successful these initiatives have been in stimulating investment in these areas.

This thesis seeks to judge the effectiveness or otherwise of regeneration initiatives by providing a comprehensive evaluation of these policies. Successful regeneration will be crucially dependent on a broader range of, potentially conflicting, policy initiatives and actions impacting on the industrial property market. For example, many commentators in the Netherlands have argued that restrictions on greenfield development might assist in reversing the process of decay of existing industrial areas by steering investment activity into these areas. As a result, a comprehensive assessment of the relationship between government intervention and the performance of the industrial property market is essential if meaningful conclusions are to be drawn about the impact of regeneration policies on investment activity. Therefore, the overarching aim guiding this research is to assess the impact of government policies on the industrial property market. The research concentrates on land use planning and physical regeneration policies, which arguably have the most profound impact on the industrial property market.

In order to meet the overall research aim, this thesis pursues four research questions that address 1) how municipalities determine the overall quantity and price of land to be made available for industrial development; 2) whether physical regeneration initiatives are delivered in appropriate areas, given their underlying goals and objectives; 3) to what extent the planned provision for new industrial development affects private sector investment in existing areas; and 4) whether or not physical regeneration initiatives are effective. A variety of methodological and analytical approaches are applied to

establish a better basis for understanding the relationship between government policy and property market performance. As such, this research responds to calls for greater methodological pluralism in property research.

The first research question is addressed in chapters 2 and 3. Municipalities have since long recognized that simply allocating land for industrial purposes in local land use plans does not guarantee that it will be taken up for development. Therefore, they have pursued an 'active land policy', which implies that they buy, develop, service and sell the land themselves. Municipalities thus have a crucial role in affecting supply and influencing the price at which building plots are offered for sale. Chapter 2 demonstrates that municipal decisions to release more land for industrial development are based on the principle that the amount of land has to be sufficient to ensure a steady supply of serviced land. As a rule of thumb, the readily available supply of industrial land should be sufficient to accommodate between two to five times the average annual take-up. New additions to the stock of building land have to keep up with the amount of land sold or leased: one hectare taken up, one new hectare supplied. It is, therefore, not surprising to find that decisions to make more land available are mainly informed by extrapolation of both previous and current sales levels.

Chapter 3 explores how municipalities determine the asking prices of the land they offer for sale. The results presented in this chapter indicate that the comparative method is the preferred valuation approach amongst municipalities. This technique entails making a valuation by using evidence from prices for similar plots in similar locations. A common perception is that industrial land is normally sold below the maximum price that firms would be willing to pay (given by the residual value) due to the presence of local competitive pressures between municipalities. The analyses carried out in this chapter were not designed to draw conclusions as to whether land is actually sold below its market value, but they are supportive of the view that asking prices are critically dependent on the extent of competition that municipalities face from each other.

The second research question is dealt with in chapter 4. In this chapter evidence is presented from a model that predicts the probability of a site being targeted by regeneration so as to examine which factors municipalities take into account in deciding whether to designate a particular site as a regeneration area. According to the literature examining economic development policy, initiatives that target particular areas have little success if they are not delivered in the right locations – that is, the most economically distressed areas. The results of the analysis suggest that, while regeneration initiatives are delivered in areas characterized by a number of physical problems, these areas do not exhibit higher levels of economic distress in terms of a decline in employment,

firm numbers or property values. From this it is concluded that regeneration initiatives are not necessarily targeted at the sites in need of intervention.

Chapter 5 is concerned with addressing the third research question. Data on building permit activity are utilized to estimate the impact of the planned provision for new industrial development on property investment undertaken by firms located on industrial sites. Findings indicate that the overall amount of readily available land in the local market area does not appear to be influencing refurbishment and redevelopment activity at existing sites. It thus seems that constraints on greenfield development will not necessarily contribute to reversing processes of decay in older industrial areas. Chapter 5 also shows that investment in new commercial buildings is influenced by the available supply at the site-level. However, this influence appears rather weak, which suggests that the actual pattern of new industrial development is not primarily driven by land availability. Instead, the evidence indicates that quality and locational characteristics are more important in the firm's investment decision.

The fourth and final research question is addressed in chapters 5 and 6. The evidence presented in chapter 5 supports the view that publicly financed improvements will induce increased investment in commercial buildings, whether new completions or refurbishment of existing ones. It appears that it is the actual timing of regeneration projects that stimulates private sector property investment: investment activity is more likely to take place and the level of expenditure will be higher in the period that physical improvement activities are undertaken on the site. However, regeneration policies pursue other goals as well. An analysis of master plans reported in chapter 6 reveals that the policy officials responsible for regeneration consider it primarily as a means to promote local economic development. Yet, at the same time, this chapter concludes that regeneration initiatives are largely ineffective in achieving these economic development goals. The initiatives being evaluated have not increased employment or the number of businesses beyond what would have occurred without the interventions.

Finally, chapter 7 discusses the results obtained in relation to the overarching aim of this thesis and considers implications for policy makers. There are two key messages. First, while it has been argued that successful regeneration requires an appropriate mixture that combines development constraints on greenfield sites with public investments in the physical environment of rundown sites, this research does not lend support to the claim that constraints on greenfield development actually assist in fostering regeneration of rundown areas. Second, policy makers should be cautious in using physical regeneration interventions as an instrument to promote economic development. The central assumption underpinning regeneration policies that a strong relationship exists between improvements to the physical environment and economic development outcomes has not been substantiated empirically.

SAMENVATTING

Vanaf het begin van de jaren negentig hebben nationale en lokale overheden in Nederland aanzienlijke financiële middelen vrijgemaakt voor de herstructurering van verouderde bedrijventerreinen. De rijksoverheid alleen al heeft tussen 2000 en 2013 naar schatting circa 770 miljoen euro gereserveerd voor de herstructurering van bedrijventerreinen. Herstructurering vindt in de regel plaats op bedrijventerreinen waar sprake is van fysieke veroudering: verouderd vastgoed, extensief ruimtegebruik, achterstallig onderhoud van de openbare ruimte, slechte bereikbaarheid en verouderde infrastructuur. Gemeenten zijn verantwoordelijk voor de herstructurering, waarvan ze doorgaans de initiatiefnemer zijn. Zij zijn dan ook de belangrijkste ontvangers van de subsidies die hogere overheden beschikbaar hebben gesteld voor herstructurering, hoewel ze zelf ook geld vrijmaken voor de financiering van herstructureringsprojecten. De herstructureringsingrepen die door gemeenten worden uitgevoerd zijn vrijwel uitsluitend gericht op het verbeteren van de fysieke omgeving van het betreffende terrein. Het betreft investeringen in de openbare ruimte, structurele verbeteringen van de infrastructuur, bedrijfsverplaatsingen en de verwerving van gronden waarna deze bouwrijp worden gemaakt. Een van de belangrijkste veronderstellingen achter het herstructureringsbeleid is dat publieke investeringen in de fysieke omgeving een stimulans vormen voor ondernemers om ook te investeren in het terrein. Of dit beleid er daadwerkelijk in slaagt om private investeringen uit te lokken is evenwel niet bekend.

Dit proefschrift beoogt het succes of falen van herstructureringsingrepen vast te stellen door middel van een integrale evaluatie van het overheidsbeleid. Een succesvolle aanpak van verouderde bedrijventerreinen is namelijk afhankelijk van een bredere reeks, mogelijk tegenstrijdige, beleidsinitiatieven en -acties waarmee overheden invloed trachten uit te oefenen op de markt voor bedrijfsruimten. Zo zou een meer restrictief ruimtelijke ordeningsbeleid ten aanzien van uitleglocaties volgens velen helpen bij het tegengaan van veroudering op bestaande terreinen doordat bedrijven gestimuleerd worden om te investeren in hun huidige pand. Het trekken van zinnige conclusies over het effect van herstructureringsingrepen op het investeringsgedrag van ondernemers vergt daarom een integrale beoordeling van de relatie tussen overheidsinterventies en het functioneren van de markt voor bedrijfsruimten. De beoordeling van de effecten van overheidsbeleid op de markt voor bedrijfsruimten vormt dan ook de centrale doelstelling van dit onderzoek. Daarbij ligt de nadruk op ruimtelijke ordeningsbeleid en herstructureringsingrepen, omdat die over het algemeen de grootste invloed uitoefenen op dit vastgoedsegment.

Om de doelstelling van het onderzoek te bereiken zijn vier onderzoeksvragen geformuleerd die zich richten op 1) de wijze waarop gemeenten de hoeveelheid grond, alsmede de prijs waarvoor zij deze grond op de markt

brengen bepalen; 2) of de juist terreinen worden geherstructureerd in het licht van de doelstellingen die ten grondslag liggen aan dit beleid; 3) in hoeverre het aanbod van nieuwe terreinen van invloed is op investeringen op bestaande bedrijventerreinen; en 4) of herstructureringsingrepen effectief zijn. Er worden verschillende methodologische en analytische benaderingen gehanteerd om een beter inzicht te krijgen in de relatie tussen overheidsbeleid en het functioneren van de vastgoedmarkt. Als zodanig gaat dit onderzoek in op aansporingen tot meer ‘methodologisch pluralisme’ in vastgoedonderzoek.

De eerste onderzoeksvraag wordt behandeld in de hoofdstuk 2 en 3. Gemeenten hebben al lang geleden ingezien dat het simpelweg bestemmen van gronden voor bedrijfsmatige doeleinden niet garandeert dat deze gronden ook daadwerkelijk in ontwikkeling genomen worden. Daarom zijn gemeenten een ‘actief grondbeleid’ gaan voeren, waarbij ze de grond zelf verwerven en bouwrijp maken om deze vervolgens te verkopen. Gemeenten spelen dus een cruciale rol bij de ontwikkeling van het aanbod aan bedrijventerreinen en de totstandkoming van prijzen voor bouwrijpe grond. Hoofdstuk 2 toont dat de gemeentelijke besluitvorming over de aanleg van nieuwe bedrijventerreinen is gebaseerd op het principe dat er voldoende direct uitgeefbare grond beschikbaar moet zijn om in iedere situatie voldoende aanbod te kunnen garanderen. Een gangbare stelregel is dat de omvang van de voorraad bouwrijpe grond toereikend moet zijn om te voorzien in twee tot vijf maal de jaarlijkse uitgifte. Om deze voorraad op peil te kunnen houden moet de productie van bouwrijpe grond gelijke tred houden met de hoeveelheid grond die wordt uitgegeven: voor iedere hectare die is uitgegeven, wordt een nieuwe hectare bouwrijp gemaakt. Het is dan ook niet verassend dat gemeenten zich primair baseren op de uitgifte in het recente verleden bij de beslissing om meer grond bouwrijp te maken.

Hoofdstuk 3 bestudeert hoe gemeenten de vraagprijzen voor bouwrijpe grond bepalen. Uit de empirische bevindingen blijkt dat grondprijzen veelal door middel van de comparatieve (vergelijkende) methode vastgesteld worden. Daarbij worden de grondprijzen vergeleken met omliggende gemeenten. Volgens velen heeft de onderlinge concurrentie tussen gemeenten een prijsdrukkend effect op de grondprijzen waardoor deze onder de maximaal haalbare prijs liggen (de residuele grondwaarde). Op basis van de analyses die in dit hoofdstuk zijn uitgevoerd kan niet vastgesteld worden of grondprijzen voor bedrijventerreinen inderdaad onder de maximaal haalbare prijs liggen, maar wel is aangetoond dat de hoogte van grondprijzen voor een belangrijk deel beïnvloed wordt door de mate van concurrentie die een bepaalde gemeente ondervindt van andere gemeenten.

De tweede onderzoeksvraag is behandeld in hoofdstuk 4. In dit hoofdstuk worden de resultaten gepresenteerd van een model waarmee de kans geschat kan worden dat er voor een bepaald terrein een herstructureringsplan bestaat.

Dit met het doel om te achterhalen met welke factoren gemeenten rekening houden bij het besluit om een terrein in aanmerking te laten komen voor herstructurering. Volgens de literatuur over economisch ontwikkelingsbeleid, zijn beleidsprogramma's die zich slechts richten op een beperkt aantal geografisch afgebakende gebieden weinig succesvol als dit niet de juiste locaties zijn. Dat wil zeggen: de gebieden waar de economische nood het grootst is. De resultaten van de analyse tonen dat de bedrijventerreinen die in aanmerking komen voor herstructurering over het algemeen geconfronteerd worden met diverse fysieke problemen, maar dat er tegelijkertijd nauwelijks sprake is van economische veroudering. Een daling van het aantal arbeidsplaatsen, het aantal bedrijfsvestigingen of de vastgoedwaarden is niet aan de orde op deze terreinen. Hieruit kan geconcludeerd worden dat herstructureringsingrepen niet noodzakelijkerwijs plaatsvinden in de gebieden waar de economische nood het hoogst is.

In hoofdstuk 5 wordt ingegaan op de derde onderzoeksvraag. Gegevens over aanvragen voor bouwvergunningen worden gebruikt om een inschatting te maken van het effect van het aanbod van nieuwe bedrijventerreinen op het investeringsgedrag van ondernemers op bestaande terreinen. Uit de empirische bevindingen blijkt dat de totale voorraad bouwrijpe grond in de regionale markt geen invloed heeft op de mate waarin renovatie en herontwikkeling van panden plaatsvindt op bestaande bedrijventerreinen. Er zijn dus geen aanwijzingen dat restricties op het aanbod van bouwrijpe grond een positieve bijdrage leveren aan het tegengaan van veroudering op bestaande terreinen. Hoofdstuk 5 laat ook zien dat investeringen in nieuwe bedrijfsruimten worden beïnvloed door het beschikbare aanbod op terreinniveau. Deze invloed is echter nogal zwak, wat er op te lijkt te wijzen dat het ruimtelijke patroon van nieuwbouwinvesteringen niet primair gedreven wordt door de beschikbaarheid van grond. In plaats daarvan lijken met name factoren die samenhangen met de kwaliteit van het terrein en de directe omgeving een belangrijke rol te spelen in het investeringsgedrag van bedrijven.

Hoofdstuk 5 en 6 richten zich op de vierde en laatste onderzoeksvraag. De aanname dat publieke investeringen op verouderde bedrijventerreinen een stimulerend effect hebben op het investeringsgedrag van ondernemers wordt ondersteund door de resultaten die in hoofdstuk 5 worden gepresenteerd. Deze conclusie kan getrokken worden voor investeringen in zowel nieuwbouw als in verbouw en herontwikkeling. Het lijkt er op dat de meeste investeringen plaatsvinden op het moment dat herstructureringsprojecten worden uitgevoerd op het bedrijventerrein: de kans dat er geïnvesteerd wordt is groter en het totale bedrag dat geïnvesteerd is hoger in deze periode. Er worden echter ook andere doelstellingen nagestreefd door middel van herstructurering. In hoofdstuk 6 worden de resultaten van een analyse van masterplannen

gepresenteerd waaruit blijkt dat de beleidsmakers die verantwoordelijk zijn voor herstructureringsplannen het eerst en vooral zien als een instrument om de lokale economie te stimuleren. Tegelijkertijd toont dit hoofdstuk dat herstructureringsingrepen nauwelijks bijdragen aan het bereiken van deze economische doelstellingen. De initiatieven die zijn geëvalueerd hebben niet geleid tot een toename van het aantal arbeidsplaatsen of het aantal bedrijfsvestingen, vergeleken met de situatie waarin er geen ingrepen hadden plaatsgevonden.

In hoofdstuk 7 worden de empirische bevinden besproken in relatie tot de centrale doelstelling van dit proefschrift en wordt ingegaan op de implicaties voor de beleidspraktijk. Er zijn twee belangrijke boodschappen. Ten eerste, lijkt het er niet op dat de veroudering op bestaande bedrijventerreinen tegengegaan kan worden door het aanbod van bouwgrond te beperken. Dit terwijl vaak betoogd wordt dat een succesvolle aanpak van verouderde bedrijventerreinen gebaat is bij een combinatie van restricties op het aanbod van bouwrijpe grond en investeringen in verouderde bedrijventerreinen. Ten tweede, dienen beleidsmakers behoedzaam te zijn ten aanzien van het gebruik van herstructurering als instrument om de lokale economie te stimuleren. De belangrijke veronderstelling die ten grondslag ligt aan herstructureringsbeleid dat er een sterke relatie is tussen verbeteringen van de fysieke omgeving en economische ontwikkeling kan niet empirisch onderbouwd worden.

REGENERATING RUNDOWN AREAS

Planning systems introduce a range of policy initiatives and instruments in order to influence the level, location and spatial distribution of business activity. In doing so, the planning system has a profound influence on the structure and operation of industrial and commercial property markets. Despite this, however, there has been relatively little research that explores the relationship between planning intervention and the performance of these property market segments. This thesis sets out to fill the gap by presenting evidence of the effects of planning policies on the industrial property market in the Netherlands. A variety of methodological and analytical approaches are applied to establish a better basis for understanding the relationship between planning policies and property market performance.

The need for work in this area is highlighted by its prominence in Dutch policy debates in recent years. Most emphasis has been placed on the role of planning policies in reversing the fortunes of rundown sites. It was argued that initiatives designed to improve the physical environment of these sites would make them more attractive places to do business, thereby stimulating economic growth and investment in these areas. In addition, these investment patterns would be reinforced by tighter planning restrictions on greenfield development. However, these relationships have been assumed, rather than investigated. This thesis shows that many of these claims cannot be substantiated empirically.



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